The Value and Necessity of the Project Management Plan
The pre-award phase of BVP projects from the vendor’s perspective

TU Delft
Witteveen+Bos

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The Value and Necessity of the Project Management Plan
The pre-award phase of BVP projects from the vendor’s perspective

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PREFACE

This graduation research is part of the MSc. Construction Management and Engineering programme at Delft University of Technology. The subject of this graduation thesis is project control in the pre-award phase of Best Value Procurement projects. The research was conducted at Witteveen+Bos N.V. who provided me the opportunity and accommodations needed to perform this research.

First of all, I would like to thank all the members of my graduation committee. Hans Bakker, for the critical and constructive comments and questions. Afshin Jalali Sohi for the many meetings, ideas and critical but also motivational words. Ype Cuperus for providing a different view on the research when this was needed. A special thanks also to the committee members from Witteveen+Bos; Tim van Dijck for helping me with the start-up of my project and monitoring the progress and Ernst Molier for providing me with loads of ideas, articles and conversations. I would also like to thank all the Witteveen+Bos employees that contributed to the research results or the pleasant working atmosphere.

Besides this, there are some people that I want to thank in particular for supporting me throughout the research and the rest of my studies. My mom, dad, Anne and Stefanie for just being curious and supportive. And of course Noortje, who has always been there to listen and help when I needed this.

Enjoy reading!

Joris Kusters
Rotterdam, November 2016
EXECUTIVE SUMMARY

The research is aimed at defining the hurdles in the pre-award phase of Best Value Procurement (BVP) projects and providing a solution to overcome those problems for engineering companies. The pre-award phase includes the period between the conditional award (Dutch: voornemen tot gunning) and the definitive award (Dutch: definitieve gunning). In this phase, the vendor has approximately two months to develop a Project Management Plan (PMP) (Rijt, 2016). The pre-award phase is seen as the most important phase in BVP projects, however, a knowledge gap exists regarding control in the pre-award phase. Exploratory interviews at Witteveen+Bos have revealed that the company struggles to control the pre-award phase of projects in which they are involved, while literature suggests that particularly front-end project development is critical for outstanding project performance.

The overall question that must be answered at the end of this research becomes:

**How can an engineering company improve control over the pre-award phase of BVP projects?**

This question is split up into three sub-questions.

**Q 1: How is project control embedded in the pre-award phase of Best Value Procurement**

**Best Value Procurement**

Best Value Procurement is a procurement method in which tenders are assessed based on their value rather than on the lowest price. In other words: the tender that provides the most value for the client is awarded with the assignment. The method was developed in the mid 1990’s by Dean Kashiwagi (2002) and the Performance Based Studies Research Group (PBSRG) at the Arizona State University (ASU). Kashiwagi’s aim was to improve the procurement and management of construction projects by reducing risks and is focussed at selecting the best available vendor for a project (Kashiwagi D., Best Value Procurement/Performance Information Procurement System Development, 2011).

BVP consists of four phases. The first of which is the preparation phase. This phase can be used by the vendor to gain experience with the BVP approach. Vendors may determine if they have sufficient expertise to engage in a project. In the assessment or selection phase, vendors are familiar with the project and have been handed over the tender documents. The different vendors prepare a concise bid (a maximum of six pages is often maintained) that is handed to the client for assessment. When all vendors have handed in their bids, the selection procedure begins. Once the Best Value vendor is determined the pre-award phase (Dutch: ‘Concretiseringsfase’) takes off. In this phase, the selected vendor transforms his proposal into a detailed project management plan in which he elaborates on how he is going to execute the project at minimum risks. The pre-award phase is considered as the most important phase of Best Value Procurement (Rijt, 2016). At the end of the pre-award phase the client can decide whether he/she wants to continue with the previously selected vendor. In the execution phase the project proposal is executed according to the PMP.

**Project Control**

The PMBOK defines project control with the following statement: “A project management function that involves comparing actual performance with planned performance and taking appropriate corrective action (or directing others to take this action) that will yield the desired outcome in the project when significant differences exist” (PMI, 2013). This definition includes monitoring and comparing with a baseline plan and taking corrective actions. Project monitoring is measuring key parameters of a project, such as progress, budget or quality.
Taking corrective action or changing the project plan when needed can be seen as ‘controlling’ the project. The importance of project control is illustrated by the PMI (2013) by the fact that the monitoring and controlling process group is involved throughout the complete project lifecycle. Project control is embedded in BVP through the PMP that is drafted in the pre-award phase. Controlling the pre-award phase itself has however proved to be difficult in practice.

Q 2: What problems arise from the gap between current and desired situation

In order to map the current situation of the pre-award phase, four projects have been taken into account; the A9 Amstelveen, Beatrix sluices, Blankenburg connection and Moorings Boven-IJssel projects. To gain insight in how the pre-award phases of these four BVP projects were executed, interviews with different team members of these projects are held. The pre-award phases of the Blankenburg connection and Moorings Boven-IJssel project have encountered cost (Blankenburg) and time (Boven-IJssel) overruns. The pre-award phases of the A9 Amstelveen and Beatrix sluices projects encountered significantly less problems. Because the interviews did not provide a clear current situation process, a workshop was organised in which participants were given the assignment to describe the most important steps and elements of ‘making a PMP’. The workshop resulted in a selection of elements which are perceived important; Vision, Team, Contract document, Guidance, Information/Assumptions and Client/Trust. However, still no structured process came forward. That current lack of structure is alarming, because it becomes very hard to improve control over a process that is not exactly known.

In a document review, the client requirement specifications (CRSs), input data and project management plans (PMPs) of the four project is examined. Differences in client requirement specifications, input data and/or project management plans are linked to the outcomes of the interviews to see where things went wrong or particularly well. From the document review, it can be concluded that the CRSs of the four projects are quite similarly structured. The PMPs were not structured according to the CRS and also showed a large differentiation from each other. An available PMP template also does not follow the structure that can be found in the CRSs.

As a conclusion of the research phase, five problematic aspects are identified that arise from the gap between the current and desired situation. 1) Scope, 2) Time, 3) Cost, 4) Strategy and 5) Integration. These aspects take central stage in the solution design.

Q 3: How can an engineering company move from the current towards the desired situation?

To answer the third sub-question, a conceptual framework is made that guides Witteveen+Bos from the current towards a desired situation. The first source of input for the conceptual framework were the conclusions from the research phase. The second source is the Guideline Systems Engineering from RWS (Dutch: Leidraad SE). This document describes a step by step approach for structuring a project. A third source for input is also a SE related RWS document. In the advice framework for SE (Dutch: advieskader SE, (RWS, 2014)), a quality assurance framework for tender document (Dutch: kwaliteitsborging aanbestedingsdossiers of KAd) is described. Central in this framework is the phasing based on respectively 10%, 50-70% and 95% progress meetings.

The conceptual framework that was designed is evaluated using expert judgements. Based on the expert judgements, the model is modified. The final process design after modification is shown in Figure I. Although the final process model has been modified based on the recommendations of W+B experts, it is not feasible to implement the process directly into all of W+B’s BVP projects. A phased implementation is therefore suggested in this report.
<table>
<thead>
<tr>
<th>Key deliverables</th>
<th>Meeting</th>
<th>Purpose of meeting</th>
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<tr>
<td>Key activities and milestones, budget estimation</td>
<td>0%* KICK OFF</td>
<td>Identify project mission and purpose, align goals client and vendor*</td>
</tr>
<tr>
<td>WRR format*, phase planning, team strategy, scope (in/out list)</td>
<td>10% SCOPE &amp; STRATEGY</td>
<td>Discuss deliverables, reach agreement in/out list</td>
</tr>
<tr>
<td>WBS, OBS, PBS, project planning*, WRR</td>
<td>50%* STRUCTURE &amp; INTEGRATION</td>
<td>Discuss risk file and method of quality control</td>
</tr>
<tr>
<td>Full content of PMP, WRR</td>
<td>90% GREEN LIGHT</td>
<td>Discuss content PMP, WRRs, project planning and budget, determine project scope</td>
</tr>
<tr>
<td>Finished PMP, contract</td>
<td>100%* CLOSE-OUT</td>
<td>Phase evaluation, sign contract, informal meeting</td>
</tr>
</tbody>
</table>

* mandatory for RWS projects

Figure I: Final process design
Conclusion

The pre-award phase is crucial in controlling the execution of BVP projects because the produced PMP provides a well-founded base for progress and performance monitoring by the project managers of the client and vendor through the WRR. However, Witteveen+Bos struggles to control the pre-award phase. This manifests itself in five project aspects that engineering companies do not seem to have under control. This is caused by the fact that there is no process standard or other document that can be used as a reference for progress and performance monitoring in the pre-award phase. Monitoring of the pre-award phase is only possible when a project manager and his core team have a standard process, a phase planning, a determination of scope, a WRR or the like available. Without monitoring, the project control cycle cannot be completed. Engineering companies can therefore improve control over the pre-award phase by implementing the proposed process schedule because it provides them with the possibility to monitor their progress throughout the phase.
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PART ONE
INTRODUCTION
1 RESEARCH INTRODUCTION

1.1 Relevance

“Poor planning is project management mistake number one” (Mochal, 2003)

“Projects fail because of poor estimates in the planning phase” (Symonds, 2015)

These statements are the titles of two of the many articles that can be found when looking for information about why projects keep underperforming when it comes to time and cost. In recent years, much has been written about time and cost escalation of infrastructure projects. “Cost overruns and benefit shortfalls of 50 percent are common; cost overruns above 100 percent are not uncommon”. “Executives typically attribute project underperformance to numerous uncertainties such as project complexity, technological uncertainty, demand uncertainty, scope clarity, unexpected geological features and opposing stakeholder views.” (Flyvbjerg, Garbuio, & Lovallo, 2009). Appealing examples of ‘derailed’ infrastructure projects are the NoordZuidlijn where monumental buildings sank more than 20 centimetres into the ground (Coever, 2012) and the Spoorzone Delft which nearly bankrupted the municipal authorities (Broos, 2014). But not only Dutch infrastructure projects face these problems. The Berlin Brandenburg Airport is perhaps the most notorious example of troubled infrastructure projects, having missed already four target opening dates and 66,500 reported defects found after the first inspection after construction (IPLA, Berlin Brandenburg Airport, 2016). But even a single missed detail in the front end development phase of projects can have significant effects. For instance when the French railway company SNCF purchased 2,000 new trains but forgot to supply the train builder with the correct railway station measurements. As a result, more than 1,000 station platforms needed to be adjusted, costing more than $68 million until today (IPLA, SNCF, 2016).

But not only monetary issues afflict Dutch infrastructure projects. Poorly thought out execution plans caused safety hazards in projects like the Grolsch stadium in Enschede (Joustra, Brouwer-Korf, Mertens, Muller, & Visser, 2012) and the bridge deck accident in Alphen aan den Rijn (Joustra, Muller, & van Asselt, Hijsongeval Alphen aan den Rijn, 2016). Unplanned events, political issues and suboptimal front end project development have a great impact on the projects lifecycle and causes project managers to lose control over the project. This problem is also seen by Flyvbjerg et al. (2009). Elkjaer and Felding (1999) believe that the problems regarding control over these large-scale projects can be found in poor risk identification in early project phases. Although the problem is recognised both in practice and literature, causes and explanations are still ambiguous. In order to define appropriate cures, it is important to define the root cause of the problem (Cantarelli, Flyvbjerg, Molin, & van Wee, 2010).

This graduation research is aimed at defining the hurdles in the pre-award phase of Dutch BVP projects and providing a solution in order to overcome those hurdles to engineering companies.
1.2 Company structure

Witteveen+Bos is a Dutch engineering firm with over 1000 employees and offices in 11 countries, with headquarters in Deventer, the Netherlands. Employees are clustered in 30 Product Market Combinations (PMCs). Each PMC focuses on a certain market segment. To safeguard an integral approach of large projects, specific PMCs work together on projects. All PMCs belong to one of the four sectors: Built environment, Deltas coasts and rivers, Energy water and milieu or Infrastructure and mobility. A detailed organizational chart can be found in Appendix C. The research is conducted within the infrastructure and mobility sector (I&M).
2 PROBLEM DESCRIPTION

2.1 Introduction

“Most people, if you describe a train of events to them, will tell you what the result would be. They can put those events together in their minds, and argue from them that something will come to pass. There are few people, however, who, if you told them a result, would be able to evolve from their own inner consciousness what the steps were which led up to that result.” This quote from Sherlock Holmes (Doyle, 1930) captures, in a novel-like fashion, the problem definition which is the starting point of this graduation research. If one is handed a guideline for a project, where all components, activities and their relations are described, he or she can most likely understand what the outcome of putting all those components and activities together will be. It is however much harder to imagine all components and activities that are required, if one is being given an end result of a project. In the highly complex, cost and time sensitive infrastructure projects of today’s world, it is therefore inevitable to provide or come up with a solid plan of action when a client wants, let’s say, a metro line right underneath the centre of a historic city (Figure 2-1).

This research focuses on the process that leads engineering companies to drafting a better project management plan. But what exactly is meant with the term project? A lot of different definitions exist, but for this research, the definition given by (Turner, 1999) is used:

“A project is an endeavour in which human, financial and material resources are organised in a novel way to undertake a unique scope of work, of given specification, within constraints of cost and time, so as to achieve beneficial change defined by quantitative and qualitative objectives.”

Every project, no matter how small or big it is, can be divided into a number of phases. According to Turner (1999), all projects consist of four phases which go from proposal and initiation, design and appraisal, execution and control to finalisation and close-out. The Harvard Business School (2004) distinguishes these four phases for project management, namely: defining and organising the project, planning the project, managing project execution and closing down the project (Figure 2-2).
2.2 Project phasing

![The Harvard Project Management Model](image)

**Define and organize**
During the first project phase, the ‘define and organize’ or initiation phase, the objective of the project is determined. An appropriate solution to a certain problem must be found. A feasibility study can be conducted in order to determine which solution options are feasible (can we do the project?) and justified (should we do the project?). If an agreement towards a general solution is reached, the project is initiated and organized. A project manager may be appointed, major deliverables are identified and project teams begin to take shape. From this point, the project proceeds to the next project stage (Barron & Barron, 2011) (Watt, 2014).

**Plan**
In the planning phase, the project is developed in as much detail as possible and the necessary steps to reach the project’s objective are planned. All work that needs to be done, together with the required resources and a producing strategy is identified in this phase. Scoping also has an important role in this phase, because it determines which activities should and should not be executed by the project team. Based on the outlined activities, tasks and their dependencies and timeframes, a project plan is drawn up. The project manager determines a budget based on provided cost estimates for labour, equipment and other resources. This budget can be used to monitor and control cost expenditure during project execution (Watt, 2014). Risks should also be identified and a risk management plan must be made. In the risk management plan, risks are coupled with actions that need to be taken in order to reduce the probability of the risk, or reduce the impact of the risk. When all work has been identified, the project schedule is drawn and the budget is determined, the three fundamental components of the planning process are complete (Barron & Barron, 2011). In the planning phase, all stakeholders need to be identified and a stakeholder management strategy or communication plan must be drafted. In this plan or strategy, the information needed to keep stakeholders satisfied and informed must be included.

Finally, a quality management plan with quality targets, assurance and control measures must be developed. This plan must be based on client request because it will only be accepted by the client if all quality targets are reached. When this is done, the project has been planned in sufficient detail and is ready to be executed (Barron & Barron, 2011) (Watt, 2014).

**Manage Execution**
In the execution phase, all the planned activities are performed. In this phase, it is important to continuously monitor progress and communicate when adjustments need to be made in order to maintain control over the progress of the project. Project managers must put a lot of effort in this. All team members are performing tasks simultaneously and information is reported in team meetings. The project manager can use this information to compare actual project progress with the project plan and take corrective action when needed.
The goal of those corrective actions should be to bring the project back on track. (When that is not possible, e.g. because governmental policy has changed or the project is too far ‘off track’, modifications to the original plan must be made.) Throughout the whole execution phase, stakeholders must be kept informed of the project’s status according to the stakeholder management plan. The project plan must be checked regularly in order to keep it up to date. Each project deliverable should be checked and measured according to the quality management plan. If all project deliverables have been produced and the client is satisfied with the results, the project can be closed down (Barron & Barron, 2011) (Watt, 2014).

Close down
During the closing down phase, all deliverables are transferred to the client. Contracts with subcontractors or material suppliers can be ended and project resources such as equipment or manpower can be released. Closure of the project should also be communicated to all stakeholders. An important activity in this phase is to conduct a study on what went well and what went wrong. “Through this type of analysis, the wisdom of experience is transferred back to the project organization, which will help future project teams” (Barron & Barron, 2011) (Watt, 2014).

2.3 Relationship between phases

However the phases are named, a certain connection or relation between the phases exists. The output of a certain phase can be used as input for the succeeding phase. At the end of the project, when all the phases, which can add up to more than four, are completed, the project is finished. When one keeps in mind that the output of the early phases is used as input for managing the project execution, the impression is created that the early project phases can directly or indirectly affect the project’s outcome.

Overall, literature points to a strong link between planning and project success (Serrador, 2013). Available studies show consistent results for the correlation of planning quality and project success. Hendrickson’s Project Management for Construction (2008), illustrates that the influence a project manager has on project outcomes decreases over time, whilst the costs for influencing the outcome increase over time. In the early project stages, activities have a greater influence on the project outcomes. So in order to control the outcomes of a project (e.g. during the execution phase) it is useful to put extra effort in the early project phases.

![Figure 2-3: Relation between influence and cost over time. Derived from: (Harvard Business School, 2004) (Hendrickson, 2008)](image-url)
Torp, Moges Belay, Thodesen and Klakegg (2016) indicate that in construction literature, cost and time overruns get much attention. This is most probably because project success, or the lack of success, can easily be visualized with time and cost overruns. They also state that there are many reasons that can influence cost development, such as uncertainties and good or poor project management of projects. The synergistic effect of these factors makes it more problematic to overcome large cost escalations and cost control challenges. Therefore, it is wise to identify, prioritize and address the cost development challenges at the critical phases like the planning phase (Torp, Moges Belay, Thodesen, & Klakegg, 2016).

According to Dvir, Raz and Shenhar (2003), a typical project management goal is “... to bring a project to completion on time, within the budget cost, and to meet the planned performance or end-product goals”. This project management goal is based on the assumption that all performance requirements and project end goals are always well defined in advance. This puts an emphasis on defining, organising and planning the project. In their research paper, it is argued that some people claim that too much planning can curtail the creativity of the project team, while there is no minimum amount of planning required in projects. They state that: “although planning does not guarantee project success, lack of planning will probably guarantee failure”.

A significant positive relationship between the amount of effort invested in defining the goals of the project and the functional requirements and technical specifications of the product on one hand, and project success on the other, is found, especially in the eyes of the end-user. Their main conclusion is that no effort should be spared in the initial stage of a project to properly define the project goals and the required deliverables. The assumption behind this position is that this reduces uncertainty and increases the likelihood of project success (Dvir, Raz, & Shenhar, 2003).

Dvir, Raz and Shenhar also mention that there are many cases where projects are executed as planned, within budget and achieve performance goals, but still turn out to be failures because they fail to produce actual benefits to the client or an adequate revenue and profit for the vendor. They therefore emphasize the importance of early client involvement in the planning process.

Other researches, such as a questionnaire about critical activities in the front-end planning phase performed by (George, Bell, & Edward Back, 2008) with more than 50 respondents revealed with statistical significance at least six activities in the front-end planning phase having impact on achieving project success. These six activities include planning of the following areas: public relations, start up, quality and safety, a project execution plan and project scope definition (George, Bell, & Edward Back, 2008).

In a research conducted by (Sözüer & Spang, 2014) about the importance of project management in infrastructure projects, interviewed experts stated that one of the most important factors leading to unnecessary high costs in the early phases are poor and inadequate planning or repetition of the planning. Besides that, insufficient description of tasks and a lack of decisions increase the time needed for execution of the early project phases. When the interviewees are asked about factors influencing costs in the execution phase, four out of the ten factors can be traced back to inadequate action in previous phases. These factors are (Sözüer & Spang, 2014):
- A lack of preparation of the handover between the design and execution phase
- Improper planning or incomplete planning or planning and design mistakes
- Inefficient project organisation
- Changes in specifications, scope and drawings during later stages of the execution phase
In another research step the interviewees were asked which of sixteen previously defined elements they would define as significant or essential for the planning process of transport infrastructure projects. The findings show that scheduling, a work breakdown structure, cost management and definition of project objectives and tasks are the four essential elements for the participants.

Abbas, Ud Din and Farooqui (2016) talk about pre-construction planning (PCP), which is the integration between client and vendor in the early stages of a project in order to ease execution. Their research outcomes demonstrated that “PCP could significantly improve project performance if implemented consistently and decorously” (Abbas, Ud Din, & Farooqui, 2016). They state that project success is greater when effort is put into PCP. The benefits are summarized below:
- Understanding of the project complexity
- Understanding of risk in early stages of the project
- Enhanced information regarding certainty of cost and schedule
- Increased probability of project success
- Improved performance during execution
- Higher chances of accomplishment of business goals
- Fewer scope and design changes

Mirza, Pourzolfaghar and Shahnazari (2013) emphasize the importance of scoping in early project phases. A major cause for unsuccessful projects is believed to be the lack of understanding or defining the project and/or product scope at the start of a project. They state that: A properly defined and managed scope leads to delivering a quality product, in agreed costs and within specified schedules to the stakeholders (Mirza, Pourzolfaghar, & Shahnazari, 2013).

The three main steps in this process are:
- Identification of the factors involved in starting a project
- Clearly defining the objectives
- Identifying measures of performance

The importance of project definition is also emphasized by Fageha and Aibinu (2013) and Gibson, Wang, Cho and Pappas (2006). Project definition can adequately provide information needed to identify activities to be performed in order to avoid major changes (e.g. in scope) that may negatively affect project performance (Fageha & Aibinu, 2013) (Gibson, Wang, Cho, & Pappas, 2006).

Wang and Gibson also performed a study in which they collected pre project planning and project performance information from 62 industrial projects and 78 building projects. Based on the obtained information, pre project planning was identified as having direct impact on project success (Wang & Gibson, 2010). In the article, the definition of pre project planning is derived from that of the Construction Industry Institute: “…the process of developing sufficient strategic information with which vendors can address risk and decide to commit resources to maximize the chance for a successful project” (Construction Industry Institute, 1995).

How well pre project planning is performed is believed to affect cost and schedule performance, as well as the overall financial success of the project. Inadequate or poor scope definition, is among the most important problems affecting underperforming construction projects. The result of poor scope definition is that the final project costs can be expected to be higher because of inevitable changes which interrupt project rhythm, cause rework, increase project time, and lower the productivity as well as the morale of the work force.
The results of their study indicate that projects with better pre project planning are more likely to have a better project performance at completion.

2.4 Importance of Front-End Project Development

"During front-end development of a project, the why, what, when, how, where, and who questions about a project are answered" (IPA, 2009). According to The Construction Industry Institute, front-end project development is “the process of developing sufficient strategic information with which owners can address risk and decide to commit resources to maximize the chance for a successful project” (Gibson, Wang, Cho, & Pappas, 2006). When these two definitions of front-end project development are held next to the studies mentioned in the previous paragraph, it can be concluded that all of these studies point out the importance of decent front-end project development with regard to project outcome or performance.

The importance of front-end project development is also mentioned in studies of Artto et al. (2001), Flyvbjerg et al. (2003) and Morris et al. (2006). They all state in a similar way that particularly in early project phase, lots of effort must be put in defining project goals, building a project team and developing a stakeholder and risk management plan. A study by Kolltveit and Grønhaug (2004) states that “although the importance of thorough front-end development has been stressed for years, the fact that projects still fail could be related to spending insufficient effort in particularly the early project phases”. This statement alone indicates the importance of FED. Other studies by De Groen et al. (2003), Oosterhuis et al. (2008) and Van der Weijde (2008) also state that front-end project development has a high influence on the project result and that significant effort in that phase is therefore recommend.

Figure 2-4 also supports the idea that front-end project development has a positive influence on project outcome. The figure illustrates that ‘good’ project definition adds more value to the project than ‘poor’ project execution could subtract (Bosch-Rekveldt, 2011). It must be noted however, that disastrous project execution can still devalue a project significantly.

Figure 2-4: The influence of front-end development on the value of a project (Hutchinson & Wabeke, 2006)
2.5 Scope

This research will focus on the pre-award phase of infrastructure projects. The name of this phase is not generally used in Dutch infrastructure projects. The term ‘pre-award phase’ is derived from Best Value Procurement (BVP) projects. In such projects, the pre-award phase is the period between the conditional award (Dutch: voornemen tot gunning) and the definitive award (Dutch: definitieve gunning). In this phase, the contender (vendor) who has been given the conditional award, has approximately two months to develop a Project Management Plan (PMP) in which all activities, risks, costs and planning should be included. This document is used by the contracting party (client) in order to decide whether the vendor has sufficient knowledge and experience to gain definite award. The choice for the pre-award phase is made in order to narrow down the research area from all Dutch infrastructure projects to Dutch BVP infrastructure projects, and because the pre-award phase has a predetermined duration. More information about Best Value Procurement and the pre-award phase will be given in Chapter 4.

2.6 Problem definition

It is difficult to find definite proof in literature that a well prepared project with an experienced project manager and a cooperative team will always result in a successful project execution. Even if the early project phases have been completed perfectly and the produced project management plan is of very high quality, there are still no guarantees for the next project stage. There are however solid grounds to believe that the opposite is true. If a company, whether it is an engineering company or not, puts little effort in the front end development phase of the project, it becomes very hard to get good project performance (Figure 2-4). For the pre-award phase specifically, a knowledge gap exists when one is looking for books, articles or other publications that elaborate on controlling the pre-award phase, while the pre-award phase is seen as the most important phase in the BVP-project cycle (Rijt, 2016).

Exploratory interviews at Witteveen+Bos have revealed that the company struggles to control the early phases of projects in which they are involved, while literature suggests that that particular front-end project development is critical for outstanding project performance.

Following from the relation between front end project development and project outcome, the decreasing influence on project value over time, and from the fact that infrastructure projects are still often not delivered within cost and performance promises, and the existing knowledge gap, the following problem statement is assumed for this research:

*If engineering companies fail to control the front-end development phase of infrastructure projects, problems will be encountered in the succeeding project stage.*
3 RESEARCH APPROACH

3.1 Research objective

This research serves two purposes; it aims to contribute to the development of a theoretical body of knowledge regarding control over the pre-award phase, but it is also focused on solving a practical problem within Witteveen+Bos. The research is therefore both theory and practice based. The problem statement in the previous chapter has made clear that there is clear a connection between front-end project development and project performance. The exploratory interviews at Witteveen+Bos have also revealed that the company struggles to control the pre-award phase of infrastructure projects. If the structure of the pre-award phase can be made more insightful, project performance may be improved. The objective of the research therefore is to make recommendations to Witteveen+Bos, and engineering companies in general, to improve control over the pre-award phase of BVP projects by making an analysis of the gap between the desired and the current situation. Improving control should result in closing that particular gap.

3.2 Research questions

To formulate a research question, the research objective must be taken into account. Answering the research question should contribute to achieving this objective. From the research objective, it follows that the aim of this research is to make recommendations to Witteveen+Bos, and engineering companies in general, to improve control over the pre-award phase of BVP projects by making an analysis of the gap between the desired and the current situation. The overall question that must be answered at the end of this research becomes:

**How can an engineering company improve control over the pre-award phase of BVP projects?**

To increase the feasibility of finding a comprehensive answer to the main research question, it is split up into three sub-questions. Each of the sub-questions addresses one of the focal areas of this research and answering the three sub-questions will lead to a final answer to the main research question.

First of all it is important to know what the relation between Best Value Procurement and project control is. Because the objective of the research is to make recommendations about improving control over the pre-award phase, the first sub-question will provide insight in this relation.

Q 1: *How is project control embedded in Best Value Procurement and specifically in the pre-award phase?*

In order to answer this question it is needed to conduct research on the following topics in literature:

1.1: Best Value Procurement & the pre-award phase
1.2: Project control

Secondly, it is important to know which problems are currently experienced by engineering companies in the pre-award phase. Therefore, an analysis of the gap between the desired and current situation in the pre-award
phase must be made. Which elements or activities that are currently performed can be eliminated and on which elements should engineering companies focus more. Identifying the problems and understanding where they derive from will lead to a better founded recommendation.

Q 2: What problems arise from the gap between current and desired situation?

In order to answer that question it is needed to analyse:

2.1: The current situation
2.2: The desired situation

The last sub-question is about improvement of the engineering companies’ approach in the pre-award phase in order to improve control over the phase.

Q 3: How can an engineering company move from the current towards the desired situation?

When these sub-questions are answered, information about the pre-award phase and project control is available. It is also known which problems currently arise in the pre-award phase and a method for improvement of control is determined. This provides enough information to answer the main research question.

3.3 Research methodology

In order to develop a solid foundation for the rest of the research a literature review on Best Value Procurement and project control will be conducted. This phase of the research is called the theoretical framework. After explaining the origins of BVP, the phased setup will be discussed comprehensively as well as the separate phases and their outcomes. Definitions of project control and methods to exert control will be discussed in the literature review afterwards. Then the relation between BVP and project control will be explored. After this, the first research sub-question can be answered.

The second research sub-question will be answered in the so-called research phase. This phase starts with a description of projects in which Witteveen+Bos has been involved in the pre-award phase. The project managers from these projects are interviewed to gain an overall image of how the company has experienced the pre-award phases of these projects.

After the interviews, a workshop with experienced W+B employees is be organised to observe how a pre-award phase is approached. The workshop attendants will also be asked to describe which particular project elements they think are important to cover in the pre-award phase.

When the results from the interviews and workshop are gathered and processed, the project management plans (PMPs) and client request specifications (CRSs, Dutch: uitvraagspecificaties) are reviewed. This document review is used to cross-check the findings of the interviews and workshop and is aimed at finding a cause for the experienced problems. In this research phase the current situation is analysed. The desired situation is developed by reducing or eliminating the experienced problems in the pre-award phase. An important deliverable of the research phase is a list of aspects that create the gap between the current and desired situation. The second research sub-question is answered at the end of the research phase.
Based on the findings in the theoretical framework and the focal aspects of the research phase a conceptual process design for the pre-award phase will be developed. This design is aimed at improving control over the pre-award phase and eliminating the current problems. The conceptual process design will be evaluated by Witteveen+Bos experts. The expert judgements are used as input for modification of the conceptual process design. This results in a final process design. Based on this design, the third research sub-question is answered.

When the research sub-questions are answered, the final conclusion of this research will be drawn and the main research question is answered. Recommendations will also be made in this final part.

3.4 Research design

![Figure 3-1: Conceptual research design](image-url)
PART TWO
THEORETICAL FRAMEWORK
4 THEORETICAL FRAMEWORK

4.1 Introduction

In this chapter literature about the main subjects of this thesis will be reviewed in order to gain understanding of the topics that are researched. Following from the problem statement and research questions, there are several topics that need attention and elaboration before the research phase can begin. First of all, Best Value Procurement and the pre-award phase will be discussed. This should provide theoretical insights that can later be used to explain observations in the research phase. A concise paragraph will elaborate about project management plans and their use. After that, the concept of project control is further explored. For this research it is important to know at what stages in a project it is possible and advisable to ‘exert’ project control and what means there are to do so. At the end of this chapter, a discussion and conclusion of the literature review is given.

4.2 Best Value Procurement

Best Value Procurement is a procurement method in which tenders are assessed based on their value rather than on the lowest price. In other words: the tender that provides the most value for the client is awarded with the assignment. The method was developed in the mid 1990’s by Dean Kashiwagi (2002) and the Performance Based Studies Research Group (PBSRG) at the Arizona State University (ASU). Kashiwagi’s aim was to improve the procurement and management of construction projects by reducing risks and is focussed at selecting the best available vendor for a project based on price and performance instead of merely focusing on price. Table 1 below explains the difference according to (Kashiwagi D., 2011).

<table>
<thead>
<tr>
<th>Quadrant I - Price Based</th>
<th>Quadrant II - Best Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Specifications</td>
<td>- Performance and price measurements</td>
</tr>
<tr>
<td>- Minimum standard &amp; qualification based</td>
<td>- Quality control</td>
</tr>
<tr>
<td>- Management &amp; Inspection</td>
<td>- Vendor minimizes risk</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quadrant III - Negotiated Bid</th>
<th>Quadrant IV - &quot;Unstable&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Owner negotiates with vendor</td>
<td>- Non-performing</td>
</tr>
<tr>
<td>- Owner selects vendor</td>
<td>- Low competition Low Performance</td>
</tr>
</tbody>
</table>

Table 1 Construction Industry Structure

Table 1 assumes that the delivery system of services is the cause for underperformance in the construction industry. Price based awards do not take differences in vendor quality and value into account and will motivate vendors to offer lower quality at a lower price. The system requires more decision making by the client, which increases the risk of deviations in the project. In order to get from low performance to high performance, the level of vendor expertise must increase while the amount of control from the client decreases. The increase in
performance and vendor expertise is accompanied by an increase in vendor accountability, preplanning, performance measurement, quality and risk management. In the Best Value environment, quality control and risk management are assigned to the vendor (or contractor). The client has a non-technical quality assurance role and is ensuring that the vendor has a quality control/risk management system that is aimed at minimizing deviations.

In the Best-Value quadrant, expert vendors are responsible for minimizing risks. This should result in a proactive instead of a reactive attitude because risk minimization maximises their profit. The client merely has a monitoring function, resulting in less additional transactions and decision making. Because the vendor is made accountable for its' own performance, vendors are stimulated to deliver better value for money (Kashiwagi D., 2011).

4.3 Phases in BVP

BVP consists of four phases; the preparation phase, assessment phase, pre-award phase and execution phase. The phases are illustrated in Figure 4-1.

4.3.1 Preparation phase

The first of the four phases of BVP is the preparation phase. This phase can be used by the vendor to gain experience with the BVP approach. Vendors may determine whether they have sufficient expertise to engage in a project. Vendors who have applied for a project may be invited to a kick-off meeting in which the project is further introduced. Although this phase is not directly linked to a specific project, vendors can benefit from preparing and learning about BVP because it can improve their understanding of the assessment procedure and client wishes (Rijt, 2016).

![Figure 4-1: Best Value Procurement phasing](image)

4.3.2 Assessment phase

In the assessment or selection phase, vendors are familiar with the project and have been handed over the tender documents. The different vendors prepare a concise bid (a maximum of six pages is often maintained) that is handed to the client for assessment. When all vendors have handed in their bids, the selection procedure begins. This procedure is composed by five filter layers (Figure 4-2): past performance information, project capability, interviews, prioritizing the Best Value vendor and dominance check. The selection criteria that are used to determine the Best Value vendor are closely related to the filters, namely: past performance information, project capability, risk assessment, value added, price, and interviews (Kashiwagi D., 2013). The filters are elaborated below.
Figure 4-2: Filter layers in Assessment phase (Kashiwagi D., 2013)

**Filter 1: past performance information**
Past performance information is submitted by each vendor in the form of a QPI (quantifiable performance information) document. The QPI can indicate if a certain vendor has competitive advantage over another vendor based on past performance. After review of the past performance information, the selection committee rates the vendors on the extent to which the information indicates that a specific vendor can fulfill the clients' requests.

For the committee to be able to rate vendors, the information in the QPI must be dominant, this means that the information must be:
- Non-disputable
- Verifiable
- Accurate
- Measurements in terms of numbers, percentages, or time
- High performance
- Show a high probability of future performance

**Filter 2: project capability**
In this filter layer, vendors are reviewed based on a number of mandatory submittals. Two of those submittals are Risk Assessment and Value Added. In Risk Assessment (two pages), the vendor must show to the client that it precisely understands which risks will be important in the project and how the vendor will cope with these risks. The Value Added submittal (two pages) provides vendors possibilities to distinguish themselves based on chances that they see to improve the value of the project within the project scope, but without (significantly) increasing project costs. The combination of Risk Assessment and Value Added is often called RAVA-plan. Rijkswaterstaat often also requires a schedule (± one page) to be submitted by the vendors to gain insight in the capabilities of the vendors. A price is also submitted to indicate the costs for which each vendor expects to be able to realize the project.

**Filter 3: interviews**
The interviews are the most important filter. The selection committee uses the interviews to determine whether key functionaries of the vendor are truly aware of the risks the project bears, are able to minimize and control these risks and to check whether the vision of the functionaries complies with that of the client.
The interviews are a key moment for the selection committee to identify the Best Value Vendor. As much dominant information as possible must be gathered from the key functionaries of the vendor. The interviews have a non-technical character and are focused on finding individuals who can lead a project team for the particular project.

**Filter 4: prioritization of vendor**

A linear matrix with weighted ratings is often used to identify the Best Value vendor. The weights per aspect are to be determined by the selection committee. To give an impression, for Rijkswaterstaat these percentages are usually as follows (RWS, 2014):

- Project capability 10%
- Risk assessment 20%
- Value added 15%
- Interviews 30%
- Price 25%

The Best Value vendor is the vendor with the highest weighted score. The selected vendor is conditionally awarded with the project/assignment.

**Filter 5: dominance check**

This filter is used to check whether the selection can be justified. An evaluation team must verify that the ratings are based on dominant information and that the submitted costs by the vendor are within the client's budget (Kashiwagi D., 2013).

4.3.3 **Pre-award phase**

Once the Best Value vendor is determined and the vendor endures the dominance check, the pre-award phase (Dutch: 'Concretiseringsfase') takes off. In this phase, the selected vendor transforms his proposal into a detailed project management plan in which he elaborates on how he is going to execute the project at minimum risks. The pre-award phase is considered as the most important phase of Best Value Procurement (Rijt, 2016). In this phase the proposal should be developed into a comprehensive project management plan (PMP) that includes the project scope, a detailed project schedule, a risk inventarisation and risk management plan, a milestone schedule, definition of client expectations, key performance indicators (KPI's), communication plan, deliverables and project planning and a format for weekly risk report (WRR) (Kashiwagi D., 2013) (Rijt, 2016). The vendor is in control during the pre-award phase, meaning that the vendor can also be held accountable for cost- and time overruns during the phase. The final goal of the pre-award phase is to gain approval of the project management plan by the client, resulting in a definitive award of the assignment/project execution to the vendor by the client.

The phase usually starts with an official kick-off meeting with the teams from both client and vendor. In this meeting the vendor explains his plan to the client more detailed than in the six page proposal. The most important elements that will be discussed in the meeting are the submitted proposal, the vendor's approach and the risk assessment and value added files (Kashiwagi D., 2013).

After the kick-off meeting, the vendor can start working on the PMP. As stated, an important component of this PMP is the project scope description and an in/out list. The scope description and in/out list describes the
direct responsibilities for vendor and client. Every project aspect that is on the ‘in-list’ is the vendor’s responsibility, project aspects that are on the ‘out-list’ are the client’s responsibility.

The risk assessment file is transformed into a risk management plan which includes mitigation strategies for each risk that can potentially harm the project’s outcome. This risk management plan can be updated during project execution if new risks (and mitigation strategies) have been identified.

In the weekly risk reports (WRRs), the vendor informs the client about progress deviations, costs, time, project opportunities and risks and their consequences on a weekly basis. The format for this report is included in the PMP. The WRR contributes to updating the risk management plan because newly discovered risks are recorded directly in the WRR. Key performance indicators are often linked to the WRR, because the performance indicators form a transparent and organized way to measure and show project performance.

An important deliverable of the pre-award phase and an important aspect of the PMP is a detailed project schedule and planning. This is the planning for the execution of the project execution phase and is also referred to as the pre-planning. The pre-planning forms a basis for coordination during execution and is used to align expectations before the execution phase takes off (Kashiwagi D., 2013). The PMP also contains elements such as a problem and goal description, organizational structure, technical, stakeholder and environmental/surroundings management plans.

At the end of the pre-award phase the client can decide whether he/she wants to continue with the previously selected vendor. The vendor is not awarded with the assignment/project execution phase before both parties are convinced that they can complete the project together successfully and a contract is signed by both parties. With the signing of the contract, the project is definitively awarded to the vendor and the execution phase begins.

![Figure 4-3: Focus phase of research](image)

**4.3.4 Execution phase**

In the execution phase the project proposal is executed according to the PMP. In this phase the emphasis is on risk management. The most important tool in this phase is the WRR. This report is used to communicate the weekly progress and conditions transparently from vendor to client. The vendor aims to minimize the risks as much as possible, as described in the risk assessment part of the PMP and describes the risks that he is signalling but are beyond his control. The client evaluates the vendor based on the WRRs and stays actively in the execution phase through the WRR (Rijt, 2016).
4.4 Project Management Plan

The focus of this research is on the Pre-award Phase (Figure 4-3). The outcome of this phase is a project management plan (PMP). This project management plan is an important document for project managers. According to the Project Management Institute (PMI) in the PMBoK, the PMP is “a formal, approved document used to guide both project execution and project control. The primary uses of the project plan are to document planning assumptions and decisions, facilitate communication among project stakeholders, and document approved scope, cost, and schedule baselines” (PMI, 2013). Figure 4-4 illustrates the essential role that a PMP plays in project guidance.

According to the PMI (2013) a PMP must contain the following themes/elements:
- Scope (management, validation and control)
- Schedule (management and control)
- Cost (management and control)
- Quality (management)
- Human Resource (management)
- Communications (management and control)
- Risk (management and control)
- Procurement (management, control and closure)
- Stakeholder (management and engagement)

Next to its function as management guidance for project management, the above listing suggests that a PMP is also used to describe how project aspects must be controlled by the project manager or project team.

Since large infrastructure projects are often highly complex, project managers have to deal with many stakeholders and high risks. A project manager has control over a project when he/she can ensure the project finishes in time, on schedule and without compromising other project objectives. It is, however, a complex task in practice, involving constantly measuring, evaluating and taking corrective actions when required (Olawale & Sun, 2010). According to Bourne and Walker (2005), there is a connection between project planning and project control. They state that a project is being perceived as ‘out of control’ when unplanned outcomes occur. The connection may be clear: when a project is not going according to plan, it is perceived out of control. The connection between project planning and project control is also seen by Merwe (2002) who states that: planning as a means to structure a project and project control are inextricably linked (Merwe, 2002). But what exactly is meant with project control and why is it so important?
Figure 4-4: Project Management Plan input and output (PMI, 2013)
4.5 Project Control

4.5.1 Control

The PMBOK defines project control with the following statement: “A project management function that involves comparing actual performance with planned performance and taking appropriate corrective action (or directing others to take this action) that will yield the desired outcome in the project when significant differences exist” (PMI, 2013). This definition includes monitoring and comparing with a baseline plan and taking corrective actions. This is schematically represented in Figure 4-5. Monitoring, evaluating and taking corrective action are control measures in this respect.

![Control cycle diagram](image)

Figure 4-5: Control cycle, derived from (PMI, 2013)

The importance of project control is illustrated by the PMI (2013) by the fact that the monitoring and controlling process group is involved throughout the complete project lifecycle. Where other processes have a limited period of interaction, monitoring and controlling remains important from the start until the finish of a project (Figure 4-6).

![Monitoring and Controlling throughout project lifecycle](image)

Figure 4-6: Monitoring and Controlling throughout project lifecycle (PMI, 2013)
The monitoring and control feedback process as defined by Labi and Moavenzadeh (2007) in Figure 4-7 starts when monitoring indicates that a project is off-track because a project has exceeded budget, is behind time schedule, when productivity is lower than planned or when the quality of materials or finished work is below standard (Labi & Moavenzadeh, 2007).

Figure 4-7: the monitoring and control feedback process (Labi & Moavenzadeh, 2007)

A somewhat similar loop is used by Meredith and Mantel (2012) who state that control is an element of the planning-monitoring-controlling cycle and that control is focused on three project elements: performance, cost and time. Both studies use the same indicators for the need of project control.

General indicators

- **Performance**
  - Unexpected technical problems arise
  - Insufficient resources are available when needed
  - Quality or reliability problems occur
  - Owner/client requires changes in technical specifications
  - Inter-functional complications and conflicts arise
  - Market changes that increase/decrease the project’s value

- **Cost**
  - Technical difficulties that require more resources
  - Scope of work increases
  - Bid amount (accepted for award) is too low
  - Lack of reporting of monitoring results
  - Project budgeting for contractor cash flows not done right
  - Changes in market prices of the inputs

- **Time**
  - Technical difficulties require more time to solve
  - Scope of work increases
  - Unexpected utilities needing relocation
  - Task sequencing not done right
  - Required material, labour/equipment unavailable when needed
  - Key preceding tasks were not completed on time
The elements with which a project manager can influence project control can be resources or project related. Resource related project control elements can again be divided in three categories: manpower-related, machinery-related, money-related.

Manpower-related control is also referred to as human resources control and can consist of for instance; firing underperforming staff members, hiring staff with the needed skills and/or assigning specific tasks to specifically skilled staff. Human resource control can also include maintain the development of the workforce. Because projects are often unique, it provides opportunities for people to gain a wide range of experience in a reasonable short period of time (Meredith & Mantel, 2012)

Machinery-related control is also referred to as physical asset control. It includes decommissioning underperforming equipment, bringing in appropriate equipment and/or re-assigning specific equipment to specific activities. Bringing in more equipment may however have economic consequences and although equipment-based control decisions are often easier to make than manpower-based decisions, some equipment-based control decisions involve a trade-off between manpower or equipment utilization (Labi & Moavenzadeh, 2007). Machinery-related control is not likely to be applicable in the pre-award phase.

Money-related or financial resource control consists of both conservation and regulation techniques. Current assets control, project budgets and capital investments controls are among those techniques. These control techniques are exercised through a series of analyses conducted by a financial team member (Meredith & Mantel, 2012).

Project-related control consists of adjustments in project size or scope. Project related control tools can be very powerful actions when a project manager wants to regain control over a project. A last resort can also be to terminate project.

4.5.2 Control measures

Project control measures are an important part of a project management plan, since they provide steering possibilities for the engineering company to control the activities, risks, costs and planning. The PMP that has been developed in the pre-award phase is therefore essential for engineering companies to control their project during the following project stages. In this paragraph, a more detailed description and inventarisation of control measures will be given based on available literature.

Best Value Procurement projects are often large scale and highly complex. Project managers have to deal with many stakeholders, changes in scope and environment and risks. A project manager has control over a project when he/she can ensure the project finishes in time, on schedule and without compromising other project objectives. It is, however, a complex task in practice, involving constantly measuring, evaluating and taking corrective actions when required (Olawale & Sun, 2010). According to Bourne and Walker (2005), there is a connection between project planning and project control. They state that a project is being perceived as ‘out of control’ when unplanned outcomes occur. The connection may be clear: when a project is not going according to plan, it is perceived out of control.

If project managers want to improve control over the pre-award phase of BVP projects, they must therefore monitor the progress, evaluate non conformities and take corrective action if needed.
Recent research by Antonio Covas Jorge (2016) on fit-for-purpose project control has yielded an extensive list of control measures. In the research by Covas Jorge in collaboration with the Brooke Institute, a comprehensive literature review combining eight sources is conducted. This combination of eight sources creates a very comprehensive list of control measures currently described in literature. The literature review resulted in a total of 131 control measures categorised in twenty categories and can be found in Appendix D. The categories can be traced back to controllable project aspects discussed in the publications.

4.6 Discussion

The theoretical framework has provided basic understanding about the research topics: Best Value Procurement, the pre-award phase and project control. This final paragraph discusses what this knowledge means for the research, how it is related to each other and how it is going to be used in the rest of the research.

Best Value Procurement is a relatively new method for procurement. This might mean that private and public companies are not yet completely familiar with the procedures and way of working. BVP focuses on the role of the vendor as an expert in the project. It means that the vendor has a lot of responsibilities, but also a lot of opportunities to leave his/her mark on the project. BVP consists of four phases, of which the pre-award phase is considered to be the most important one. In the pre-award phase, vendors must deliver a project management plan to the client that embodies all important project aspects. These aspects include project scope, a detailed project schedule, a risk inventory and risk management plan, a milestone schedule, definition of client expectations, key performance indicators (KPI’s), communication plan, deliverables and project planning and a format for weekly risk report (WRR).

If the pre-award phase is finished and the PMP shows the client that the vendor has enough expertise to receive definitive award, they proceed to the next project phase; the execution phase. The PMP plays an important role in making this decision and is also an important guideline for the vendor during the execution phase. Besides the PMP, the WRR is also important in this phase, it is used for communication between client and vendor, reporting progress and (unforeseen) risks and for evaluating the performance of the vendor.

A good PMP serves as a base for project managers or a project team to control their project. The PMP produced in the pre-award phase is therefore crucial in controlling a BVP project. This answers research sub-question 1. Project control is embedded in BVP through the pre-award phase in which a PMP is drafted that forms the basis for controlling the rest of the project. However, based on the available literature project control is not embedded in the pre-award phase itself. It is up to the vendor to decide how he controls the phase.

From the paragraphs about project control, it can be concluded that project monitoring is measuring key parameters of a project, such as progress, budget or quality. Taking corrective action or changing the project plan when needed can be seen as controlling the project. A project manager has four resources available; money, manpower (labour), materials and machinery (equipment). Adjustments of these resources can be made in order to get the project back on track. More or more experienced manpower can be deployed, more or other material and/or machinery can be used. Another option is to attempt to get the project back on track by spending more money on it. Adjustments in project size or scope can also be very powerful actions when a project manager wants to regain control over a project. A last resort can also be to terminate the project. After deviations are corrected, it must be analysed whether it has been effective and the project is back on track.
When this concerns the pre-award phase, machinery is not an available resource for the project manager to adjust. If the pre-award phase is off-track, a project manager can invest in more manpower to finish the project. The question however is whether this would be useful. Working on a single PMP with fifteen people simultaneously does not seem to make sense. Letting the same amount of people working on the PMP for a longer time can prove useful when trying to get the project back on track. Monitoring the scope of the project and taking action when the scope is perceived out of control is likely to be effective in controlling the pre-award phase.
PART THREE

RESEARCH PHASE
5

RESEARCH FINDINGS

5.1 Introduction

In this chapter, the findings of Phase I will be described. First, the projects which were included in the research are concisely introduced. After that, the interviews will be summarised. These interviews have formed the base for the research since they provided an overall view about the perceptions of project managers on the BVP approach and pre-award phase. After that, the workshop results will be given. The workshop was used to map the current situation. This was needed to be able to compare this current situation to a desired situation.

The document review in Paragraph 6.9 summarises the outcomes of the document review which was conducted to see whether large differences exist between CRSs, PMPs, the template PMP and other guidelines. These differences can possibly explain the different perceptions of the pre-award phase. The outcomes of the document review will therefore be linked to the interview outcomes. Finally, an overall conclusion for Phase I will be drawn, which will serve as input for Phase II of this research.

5.2 BVP Projects

In order to map the current situation of the pre-award phase, four projects have been taken into account in this research. These four projects are all BVP projects in which Witteveen+Bos was involved in the pre-award phase concerning a plan study phase. The selection criteria were therefore clear, the project must be a plan study assignment and W+B must have been involved in the pre-award phase. The projects must have been awarded based on the BVP approach, and they must have completed the pre-award phase. From these four projects, data has been collected according to the methodologies in Chapter 3. A concise introduction is provided to indicate an order of magnitude and complexity of these projects. A comprehensive overview of all BVP projects in which Witteveen+Bos has been involved can be found in the Appendix E.

5.2.1 A9 Amstelveen

Figure 5-1: Overview A9 Amstelveen
The A9 highway between the interchanges Badhoevedorp and Holendrecht will be thoroughly addressed. There will be four lanes and an exchange lane instead of three lanes in both directions from Oudekerk aan de Amstel until the A9 Gaasperdammerweg. This will improve traffic flow and the accessibility of the complete northern Randstad.

In Amstelveen, the A9 highway will be recessed for 1.3 km between the Amsterdamse Bos and Bovenland with two covered sections at the old village and at the town centre. The covered sections connect the north and the south of Amstelveen and reduce noise nuisance.

Alongside the A9 highway and at several highway ramps and exits, 12 kilometres of new acoustic barriers will be built. This also decreases noise nuisance and improves the air quality in the surroundings of the A9.

The crossing of the Keizer Karelweg with the highway ramps and exits of the A9 highway will be situated on the covered section at the town centre. The current flyover will be deconstructed and a pedestrian/cyclist bridge will be constructed over the crossing. Also, a wide pedestrian/cyclist bridge will be constructed between the Burgemeester Rijnderslaan and the Meander (Rijkswaterstaat, 2016d)

5.2.2 Prinses Beatrix sluices

The Prinses Beatrix sluices are the biggest monumental inland sluices in the Netherlands. The sluices are situated in the Lekkanaal near Nieuwegein. The Lekkanaal is the main waterway connection between the harbours of Rotterdam and Amsterdam. 50.000 vessels come across the Beatrix sluices on a yearly basis. Because increasingly larger vessels are using the Lekkanaal, the sluices are at risk to become a bottleneck. The Lekkanaal is widened and a third lock chamber will be constructed to improve shipping flow.

With the third lock chamber, vessels can pass the Beatrix sluices considerably faster. Without the new lock chamber, the passing time would be almost one and a half hours in 2030, with the third lock chamber, this is reduced to only 30 minutes (Rijkswaterstaat, 2016a)

<table>
<thead>
<tr>
<th></th>
<th>Current locks</th>
<th>Third lock chamber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (m)</td>
<td>225</td>
<td>270</td>
</tr>
<tr>
<td>Width (m)</td>
<td>18</td>
<td>25</td>
</tr>
<tr>
<td>Depth (m)</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>CEMT-class</td>
<td>Vb</td>
<td>Vla</td>
</tr>
</tbody>
</table>
5.2.3 Blankenburg connection

The Blankenburg connection is a comprehensive project that connects the A15 and A20 highway, west of Rotterdam. At Vlaardingen, the A20 highway is widened with one lane and an emergency lane between Kethelplein and the highway ramp/exit of the Blankenburg connection. Also, the connections Vlaardingen-West and Vlaardingen are adapted. The interchange with the A20 highway, including all highway ramps and exits and the section of the Blankenburg connection until the Aalkeettunnel, which consists of three lanes and an emergency lane in both directions, and will be constructed below ground level. The Aalkeettunnel is a so-called land tunnel in the Aalkeetpolder of approximately 510 metres in length and consisting of two, three lane tunnel tubes.

The Blankenburg tunnel connects the north and south bank of the Nieuwe Waterweg. The tunnel, also consisting of two, three lane tubes is 945 metres long. At the south bank, near Rozenburg, an elevated interchange with the A15 highway will be constructed. Several adaptations are required to connect the A15 highway to the Blankenburg connection and the highway ramp from Rozenburg-centre towards the Maasvlakte will disappear (Rijkswaterstaat, 2016b).

5.2.4 Moorings Boven-IJssel
In the Valeplas near Giesbeek, seventeen new moorings for inland skippers on the IJssel river will be created. This improves a quick and safe shipping flow, because skippers can keep to the legal operational and rest periods better. Next to the seventeen moorings for professional shipping, Rijkswaterstaat also creates moorings for the local skippers of Giesbeek.

The moorings are needed because a 2009 assessment concluded there were too little professional moorings on the IJssel river between Lobith and Kampen. Because skippers must keep to the legal rest periods, those moorings may not be situated more than two hours from each other. Besides the moorings for professional and local use, electrical facilities, a car landing stage, disembarking facilities and an adapted shipping inlet will be constructed (Rijkswaterstaat, 2016c).

5.3 Interviews

To gain insight in how the pre-award phases of these four BVP projects were executed, interviews with different team members from these projects are held. A total of six employees at Witteveen+Bos (four project managers, a sector manager involved in several BVP projects, and the department chief for the Amsterdam office, Figure 5-5) have been interviewed. The project managers represent three of the four BVP projects (A9 Amstelveen, Blankenburg connection and Moorings Boven-IJssel). All the interviewed employees are closely involved in either PMP composition, acquisition of BVP tenders or project management in BVP projects. The interviews will be transcribed afterwards and processing the results should provide a comprehensive overview of a ‘typical’ pre-award phase.

Figure 5-5: Overview of interviewed Witteveen+Bos employees

The choice for interviews is made because it is hard to observe a current process of drafting a PMP. It is a continuous process, which means several people at different time slots would have to be tracked when working at this specific assignment. Because of this, the most useful information can be gained by talking to the people who have organized or worked in the pre-award phase.

Another reason for using interviews as a means of gathering information can be found in social, policy and management sciences, where individuals are the main sources of information. This is because people can provide a wide diversity of information in a relatively quick way (Verschuren & Doorewaard, 2010). These two advantages make people very suitable as sources of information. In this research the interviewees are used as data sources, because they supply information about a process they know more about than the researcher. The amount and diversity of information increases with the amount of interviewees. This way, a lot of information about the current process can be gathered.
The conducted interviews are semi-structured. This has been deliberately chosen because the perceptions of both vendor and client are very important for a successful completion of the pre-award phase. Semi-structured interviews leave enough room for personal experiences, while not deviating too much from the original goal of the interview, gaining insight in pre-award phase execution. The interviews with Witteveen+Bos employees were planned beforehand via email. In this email, a concise introduction of the research topic and goal of the interview were given. The interviews lasted approximately 30 minutes and can be found in Appendix F.

The first section of the interviews consisted of nine closed questions. The first four interview questions aimed at creating a certain context in which the interviewee can be placed. Function, educational background and years at Witteveen+Bos can influence the employee to follow a certain working process. This can be either project or process oriented, and based on (management) theories or practice/working experience. The fifth question was a simple yes/no question and functioned as a check to whether the interviewee have or haven’t performed activities in a pre-award phase in one of the four BVP projects. Question six to nine were directed at gaining insight in the projects that were covered by the interviewees, client diversity, project duration, and team size (and composition) in the pre-award phase.

The second section consisted of more open questions and was focused on gaining insight in the advantages and disadvantages of the pre-award phase as perceived by the interviewees. The first two questions of this section aimed at collecting overall opinions and experiences of BVP projects and the pre-award phase in particular. If an interviewee does not agree with the BVP approach at all, it is likely that the pre-award phase is perceived as frustrating or unnecessary. If an interviewee however completely agrees with the BVP approach, there is still a possibility that he or she encountered problems in the pre-award phase. The problems and frustrations encountered in the pre-award phase are to be made clearly evident before improvements can be proposed for the pre-award phase. Questions three to seven aimed at finding causes for problems or frustrations encountered in the pre-award phase. Unclear client requirements, unavailable information, unclear deliverables, an unclear process or planning are amongst possible causes. The final two questions consisted of evaluating the ending of the pre-award phase. Client and interviewee satisfaction and the evaluation method took central stage here.

5.4 Interview results

In this paragraph, the most important results are described, categorised per interview question. Because the first section of the interview consisted of closed questions, the answers to this section will be given in Table 2 below. Although the answers given in the second interview section were a lot more extensive, only the focal points will be mentioned in this report. The full interview transcripts can be found in Appendix F. For some questions, respondents 2 and 4 were not able to answer because they have not performed any activities in the pre-award phases of the four aforementioned projects. After the results have been described, the conclusion of the interviews will be drawn.
Section 1

<table>
<thead>
<tr>
<th>Respondent 1</th>
<th>Respondent 2</th>
<th>Respondent 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function</strong></td>
<td>Track Decision Manager</td>
<td>Project Manager</td>
</tr>
<tr>
<td></td>
<td>PMC Plan Studies and Process Management</td>
<td>PMC Civil Structures for Railways</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td>Master of Law</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td><strong>Years W+B</strong></td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td><strong>Pre-award</strong></td>
<td>Yes</td>
<td>Not in project</td>
</tr>
<tr>
<td><strong>Project</strong></td>
<td>Blankenburg connection (A9 Amstelveen)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Client</strong></td>
<td>both Rijkswaterstaat</td>
<td>-</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>2-3 months (Blankenburg)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Team size</strong></td>
<td>10, but we could have done it with 3</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Respondent 4</th>
<th>Respondent 5</th>
<th>Respondent 6</th>
</tr>
</thead>
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<td>Head of Office Amsterdam</td>
</tr>
<tr>
<td></td>
<td>PMC Plan Studies and Process Management</td>
<td></td>
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<tr>
<td><strong>Education</strong></td>
<td>Process and Environmental Studies</td>
<td>Economy and Building Engineering</td>
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<tr>
<td><strong>Years W+B</strong></td>
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<td>19</td>
</tr>
<tr>
<td><strong>Pre-award</strong></td>
<td>Yes</td>
<td>Not in project</td>
</tr>
<tr>
<td><strong>Project</strong></td>
<td>Moorings Boven-IJssel</td>
<td>-</td>
</tr>
<tr>
<td><strong>Client</strong></td>
<td>Rijkswaterstaat</td>
<td>-</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>5 months</td>
<td>-</td>
</tr>
<tr>
<td><strong>Team size</strong></td>
<td>3 people team, but a total of 15-20 people</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 2: Interview respondents

Section 2

All respondents were to some extent positive about BVP. The most important comments were that it is nice to have responsibility as a vendor in the whole process, but that the client has more expertise on some terrains (e.g. stakeholder management). This can cause some friction. Another comment that has been made is that the pre-award is used as a scoping phase while RWS does not agree because they believe that an agreement is reached based on goals. Alignment of goals, determination of scope and division of (expert) roles are stated to be the most important elements of the pre-award phase.
- The Beatrix sluices were a good example of a BVP project and there were no problems worth mentioning, especially because both parties had organised the project well internally.
- The Blankenburg connection project has encountered large cost overruns. This was due to ambiguity about the project approach, RWS did not trust W+B completely and thus the PMP became very extensive.
- The A9 Amstelveen project was a great example of a BVP project. The project manager stated that no problems were encountered, the collaboration between client and vendor was clear and the phase was structured.
- The Moorings Boven-IJssel has delivered a good PMP, but W+B took too long to finish it. There was too much time needed for negotiation and the PMP has become too extensive.

The requirements for the PMP are perceived rather clear by the respondents. The CRS describes the products RWS wishes to see in the PMP. It is however harder to determine the level of elaboration. The amount of information that is made available by the client is perceived as unstructured. The respondents received an overload of information which had to be processed in order to be useful. More explicit and clear information is desirable.

The respondents did not agree on the question whether or not it was easy to oversee the necessary activities in the pre-award phase. Especially in the Blankenburg connection project it was not easy to oversee because the scope and workload changed several times during the phase. In the other projects, the amount of work could be estimated more easily, although the amount of time for the Moorings Boven-IJssel was estimated wrong. Only in the A9 Amstelveen a strict phase planning was used.

5.5 Interview conclusions

The interviews did not provide an unambiguous picture of the pre-award phase. The answers given by the interviewees are too diverse. None of the interviewees mentioned any kind of PMP template or other regularly followed guideline or structure. The perceptions of the pre-award phases by the different interviewees also differ greatly from each other. Where the Blankenburg connection project ended up with a major overrun and the Moorings Boven-IJssel project encountered problems with project duration, the pre-award phase of the A9 Amstelveen project was perceived perfectly smooth, without major cost-, time-, documentation or communication issues. This is possibly related to team composition or project team organisation. Respondent 1, 3 and 4 also mentioned this in the first question of section 2.

The pre-award phases of the Blankenburg connection and Moorings Boven-IJssel project have encountered cost (Blankenburg) and time (Boven-IJssel) overruns. The project managers of those two projects were not satisfied with the performed pre-award phase because of this. Cost control is especially important because the price is determined before the pre-award phase begins. The importance of time control can also be linked to question seven of section two, in which three of the four respondents stated that there was no clear planning. These two aspects are therefore expected to need control.

Another project aspect that was mentioned in the interviews was scope. To quote respondent 1: “pre-award phase is scoping phase, but RWS does not agree”, and respondent 3: “the PMP has become very extensive because sections were added continuously”. Determination of scope is therefore also an aspect that needs attention.
5.6 Workshop

Because the interviews did not provide a clear current situation process, a workshop is organised in which participants were given the assignment to describe the most important steps and elements of 'making a PMP'. These steps are used to map the current situation. The participants of the workshop were not the same as the interview respondents. The workshop was conducted with a group of six W+B employees who were invited via email. The assignment was explained just before the workshop started. The six employees are divided in three couples who all needed to design the process by themselves. During the workshop, the researcher observed the participants. When all couples were finished with the assignment, the results were handed to the researcher and a plenary discussion took place. This experimental method can provide information that has not been obtained in the interviews.

5.7 Workshop results

The workshop resulted in three different documents or viewpoints on which elements of the PMP and activities in the pre-award phase are the most important. The workshop result sheets can be found in Appendix G. The attendants of the workshop agreed at the end of the workshop that there were six important elements when making a project management plan.

Observation of the teams during the workshop provided some interesting insights:

- All teams approached the assignment differently
- Only one of the teams approached the assignment process-like
- Only one of the teams asked itself why certain elements would be important in a PMP
- There is no distinct order of importance in the six elements

The six elements which are perceived important are; Vision, Team, Contract document, Guidance, Information/Assumptions and Client/Trust.

Vision is about a shared understanding of the approach. The approach is the way the problem is going to be tackled. All steps in the approach can be traced back to the vision.

The Team aspect is to ensure that team members cooperate well with each other. Lines must be short and the working activities must fit with each other.

A PMP is also a Contract document. This is purely a business document to prevent misunderstandings about expectations. The most important thing here is the in/out list.

Guidance is about keeping control. Extra attention must be paid to this particular aspect for the sake of this research. Finding out what the control mechanisms within the pre-award phase are and which control measures suit the phase best contributes to answering the research question.

Information/Assumptions is about consistently using the same input data and assumptions to improve the quality of the PMP. An important element of this aspect is the risk division between client and vendor.

Client/Trust is an aspect that is focused on minimizing the effort the client has to put into checking the vendor’s work. In an ideal situation, the client feels no need to do so.
Still no clearly structured process came forward in the workshop. Only one of the three workshop teams took a process-like approach, and while the other teams agreed with this in the evaluation round, it was clear that there was not a pre-defined PMP drafting process which all teams followed. If a process map then has to be drawn based on the workshop, it would look like Figure 5-6 below. Based on the workshop results, the impression exists that all six elements are of the same importance and it seems that there is no logical sequence of performing tasks.

Figure 5-6: Process map, derived from workshop

5.8 Workshop conclusion

The six PMP aspects represent the six most important functions/elements that the PMP must embody. As stated in the previous paragraph, there is no clear order of importance and no logical order, although one of the teams approached the problem process-like. From this workshop and the interviews, it can be concluded that, at this moment, there is no structured process of drafting a PMP. Following from this workshop, the integration of elements is an area of attention. If engineering companies/project managers are able to integrate the elements with each other well and create a consistent report with a logical structure, they are likely to have control over the pre-award phase.

That current lack of structure is alarming, because it becomes very hard to improve control over a process that is not exactly known. If however, it is possible to find a desired process description, it might be possible to propose control measures that enable project managers to guide their projects from the current, unstructured situation towards the desired, structured situation. The desired, structured situation must then come forward in the document review in which client request specifications, a PMP template and process description from the client (RWS) were reviewed.
5.9 Document review

Besides the interviews and the workshop, the client requirement specifications (CRSs), input data and project management plans of the four projects will be examined. Differences in client requirement specifications, input data and/or project management plans will be linked to the outcomes of the interviews to see where things went wrong or particularly well.

The translation from CRS to PMP can become an important aspect of this research, because the pre-award phase should be followed by a definitive award by the client. If we can fulfil the client's demand every time, within budget and schedule, the research goal would be reached. At the beginning of the pre-award phase, a client requirement specification is handed to, in our case, the engineering company (vendor). This client requirement specification includes, as the name suggest, all requirements that the engineering company should meet in order to satisfy the client’s demands. The requirements can refer to the level of detailing of information, project aspects that must be addressed, but it can also be process prescriptions. The client requirement specification serves as a base for the PMP and, if it is prepared well enough, meeting the specified requirements should satisfy the client and prevent difficulties in the next project stage.

5.10 Document review results

The document review is divided in four parts. The CRSs of the four projects will be compared with each other to see if there are any big differences between them. Their PMPs will also be compared with each other to see if and how much their content or structure differs from each other. Then the PMPs are compared with a so called PMP template, a document that has been created by Witteveen+Bos to ensure a uniform appearance and content for all their PMPs. Finally the CRSs are compared with the PMP template in order to see if the template does in fact comply with all the demands in the CRS. Afterwards, conclusions from the document review will be drawn.

5.10.1 CRS comparison

First, the contents of the CRSs of the four projects are compared with each other. No remarkable differences between the four CRSs were found. The client of all four projects is RWS. The content of the four specifications is, perhaps as expected, to a large extent similar to each other, apart from some designations and level of elaboration of project specific aspects. Overall, the four CRSs are roughly structured as presented below, a more detailed structure of the CRSs can be found in Table 3.

1. Project
2. Assignment
3. Project Management and Project Control
4. Design and Execution
5. Stakeholder and Environment Management
6. Conditioning
7. Market

These seven aspects were present in all four CRSs, followed by a certain amount appendices. These appendices contained project specific information that could be used as input by Witteveen+Bos for the PMP. Besides these findings, looking at the CRSs alone does not provide many new insights.
5.10.2 PMP comparison

The project management plans differ much more from each other than the CRSs. Not only in size (127, 208, 342 and 360 pages), but also in structure. The PMPs for the Blankenburg connection and Moorings-Boven-IJssel are structured quite similarly and are also the smallest ones in size. The PMP for the A9 Amstelveen consists of one ‘main’ PMP with three sub plans. The PMP for the Beatrix sluices also has one ‘main’ plan, but has a total of 20 sub plans. The elements from the CRSs can be found in all the PMPs, so no elements were ‘forgotten’ in any of the PMPs. The reason for this can be found in the fact that the client would never accept a plan in which not all their requirements are addressed. None of the PMPs followed the structure from the CRS (!).

5.10.3 PMP/Template comparison

Witteveen+Bos has produced a so called PMP template which should help their employees with making a structured PMP. If we look at the content of the template, we can see that the structure of some of the PMPs can be traced back to this template. The plans for the Blankenburg connection and Moorings Boven-IJssel follow the template PMP to a large extent. This explains the observation why they were structured quite similarly. However, big differences also exist when we look at the structure of the plans of the A9 Amstelveen and Beatrix sluices projects. What strikes, is that the PMPs which were structured like the template, were the PMPs for the projects that encountered the most problems (cost overruns for the Blankenburg connection and time overruns for the Moorings Boven-IJssel). All PMPs addressed the aspects mentioned in the CRSs, but perhaps the template does not.

5.10.4 CRS/Template comparison

When we look at the structure of the PMP template and compare it to the general structure of the CRS, it is clear that the structures of the reports differ enormously (Table 3). These differences can cause difficulties when trying to fit the client requirements in the template. An important issue to notice in this comparison is that, although the PMP template is quite comprehensive and complete, it lacks a chapter on ‘Stakeholder and Surroundings Management’. In the interview with respondent 1 it became clear that an unclear division of roles in this field can cause problems in the process. Another problem that arose during the document review was the amount of effort employees had to put in finding the PMP template.

<table>
<thead>
<tr>
<th>Client Request Specification</th>
<th>PMP Template</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Project</td>
<td>1. Introduction</td>
</tr>
<tr>
<td>Context</td>
<td>Cause</td>
</tr>
<tr>
<td>Problem description</td>
<td>Content of PMP</td>
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<tr>
<td>Project goal</td>
<td>Reading guide</td>
</tr>
<tr>
<td>Project definition</td>
<td>Relation PMP and quality management system W+B</td>
</tr>
<tr>
<td>Assumptions</td>
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</tr>
<tr>
<td>Project team Client</td>
<td>2. Scope and Goals</td>
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<td>Project team Vendor</td>
<td>Scope</td>
</tr>
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<td>Goals</td>
</tr>
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<td>2. The assignment</td>
<td>In/out list</td>
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<tr>
<td>Assignment definition</td>
<td>Assumptions</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------</td>
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<tr>
<td>Regulations</td>
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<tr>
<td>Contract philosophy</td>
<td>3. Organisations and collaboration</td>
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<tr>
<td>Interaction Client and Vendor</td>
<td>Project organisation agreements and expectations</td>
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<td>Escalation scheme</td>
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<td>3. Project Management and Project Control</td>
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<td>Weekly reporting</td>
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<td>5. Contract</td>
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<td>4. Design and Execution</td>
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<td>Goal</td>
<td></td>
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<tr>
<td>Plan requirements</td>
<td>6. Progress reports</td>
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<tr>
<td>Plan design</td>
<td>Weekly reports</td>
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<td>Progress reporting</td>
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<td>5. Stakeholder and Environment Management</td>
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<tr>
<td>Process management</td>
<td>7. Risk Management</td>
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<tr>
<td>Communication</td>
<td>Goal of risk management</td>
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<tr>
<td>Monitoring and information</td>
<td>Risk file and responsibilities client and vendor</td>
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<tr>
<td>6. Conditioning</td>
<td>8. Interface Management</td>
</tr>
<tr>
<td>Goal</td>
<td>Introduction</td>
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<tr>
<td>Permits and procedures</td>
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<td></td>
<td>Goal and milestones</td>
</tr>
<tr>
<td>7. Market</td>
<td>Detailed work planning</td>
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<tr>
<td>Goal</td>
<td>Product planning</td>
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<tr>
<td>Market processes</td>
<td>Decision list client</td>
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<td></td>
<td>Planning control</td>
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<td>10. Information Management</td>
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<td>Archiving</td>
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<td>Information flows</td>
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<td>Information control</td>
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<td>External document map</td>
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<td>Use of relatics</td>
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<tr>
<td>11. Financial Management</td>
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<td>Budget structure</td>
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Table 3: CRS/Template comparison

<table>
<thead>
<tr>
<th>Payment and terms</th>
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<tbody>
<tr>
<td>12. Quality Management</td>
</tr>
<tr>
<td>Goal</td>
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<tr>
<td>Implementation</td>
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<tr>
<td>Quality requirements</td>
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<tr>
<td>Procedure</td>
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<tr>
<td>Key Performance Indicators</td>
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<tr>
<td>External review</td>
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<tr>
<td>Internal audits</td>
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<tr>
<td>External audit of systematic contract control</td>
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<tr>
<td>Procedure for non-conformities</td>
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</tbody>
</table>

5.11 Document review conclusion

From the document review, it can be concluded that the CRSs of these four projects are quite similarly structured. The PMPs were not structured according to the CRS and also showed a large differentiation from each other. The PMP template also does not follow the structure that can be found in the CRSs. The PMPs that follow the structure from the PMP template were the PMPs that encountered the most problems in the pre-award phase according to the respondents. In conclusion, the lack of structure at the vendor side (Witteveen+Bos) is clearly visible. Attempts to structure the PMPs consistently have not had the desired effects because the PMPs that followed the template encountered problems and the PMPs that were structured differently were created more ‘smoothly’. Important aspects are missing in the template PMP. The focus of an engineering company must be on delivering a high-quality instead of merely checking the boxes which are prescribed in either the CRS or template PMP. This does not necessarily mean that increasing the size of a PMP improves its’ quality. The quality of a PMP lies in the completeness and the ability to show the client that all project aspects are understood. In the PMPs that caused fewer problems in the pre-award phase, the function of the PMP (and sub plans) is clear. Every aspect of the plan has its own purpose and the approach is made clear in the main plan.

5.12 Overall conclusion for research phase

In this paragraph, the conclusion of the three research aspects are brought together. This must create a comprehensive image of which aspects of the pre-award phase need attention. From the diverse answers of the interviews, unstructured approach of the workshop assignment and broad variety of PMP set-ups, as experienced in the document review, it can be concluded that at this moment, there is no established structure when making a PMP. It is assumed that the differences in PMPs and pre-award phase outcomes can be ascribed to this lack of process structure.

All interviewees and workshop attendants had a clear view on what are important aspects of the pre-award phase. These aspects are however not linked to each other in a particular process. This means that it has not became clear what exact connections between the elements exist. Also, the sequentiality of activities is not clear. Integration of these aspects will therefore be one of the focus areas of the rest of this research. Integration is not only applicable in the described projects, different projects consist of different project
aspects and these aspects must be put together in order to complete the project successfully. Integration is therefore an area that every project manager must put effort in.

Scope has also shown to be an aspect that needs attention. The reason why the pre-award phases take too much time and cost too much money can be partly ascribed to the fact that the scope can increase during the pre-award phase. Clear scope definition in the pre-award phase can prevent major cost and time overruns.

Cost and time are factors that were mentioned in the interviews as well. If a project encounters major time and/or cost overruns, it is likely not to be perceived as successful by either the client and/or vendor. These aspects will therefore also be included.

The last aspect is strategy. In the document review it became clear that there is a clear lack of structure. The PMPs are produced in order to get the clients approval, but there is no real strategy to obtain this approval. The PMP template provides a list of elements that should be included in the PMP, but since every project is by definition unique, it is important for the project members to gain a clear impression of the goal of the project. If the goal of the project is known, the purpose of the PMP will become more clear. The goal of the PMP is to describe comprehensively how an engineering company believes to achieve the project goals. The five project aspects that need the most attention, and will take central stage in the solution design now become:

- Scope
- Time
- Cost
- Strategy
- Integration

These five project aspects also indirectly answer the second research sub-question: What problems arise from the gap between current and desired situation? In the current situation, W+B struggles to control scope, time, cost, strategy and integration in the pre-award phase. The problems experienced by W+B arise from the fact that there is a gap between the current and the desired situation. In the desired situation, W+B is able to control these five project aspects.
PART FOUR
SOLUTION DESIGN
6 PROCESS DESIGN

Following from the findings of the previous chapters, a process that is aimed to provide a solution for the identified problems is designed. This chapter describes how that process is designed, what the input of the process is and how the process can improve engineering companies’ control over the pre-award phase.

6.1 Process input

The input for the process design consisted of several sources. The first source of information is the conclusion from the research phase. In order to improve control over the pre-award, the focus must be on controlling scope, time, cost, strategy and integration. These aspects will receive extra focus in the process design. An aspect that has not emerged from the research phase but plays an important role in BVP according to the literature review is the WRR that is also used to assess project (and vendor) performance.

The second source is the Guideline Systems Engineering from RWS (Dutch: Leidraad SE). This document describes a step by step approach for structuring a project. This is done in the six steps that are listed below. A more elaborate description of the steps and suggested process in the guideline can be found in Appendix J.

- Analyse project assignment
- Structure work packages and products
- Structure organisation
- Control baselines
- Define verification and validation methods
- Control scope

Following these steps should enable a project manager to have sufficient overview over the project to ensure a smooth transition to the next project phase (RWS, 2013).

An important similarity that can be found between the two sources of input is scope. Determining the scope at an early stage and controlling it during the pre-award phase will therefore be an important process element. Structuring work packages and products is related to integration. When all products are structured properly, it is easier to integrate them into one PMP because their relations to each other are clearly defined.

Analysing the project assignment and structuring the organisation is linked to strategy. When the project assignment is analysed at the start of the pre-award phase and the project team is brought together and organised, a clear strategy must be determined.

Controlling of baselines is related to time control. The baseline schedule that is made at the beginning of the pre-award phase serves as a guideline to monitor and control time and progress.

The elements that do not appear both in the research outcome and the systems engineering guideline are cost control, the WRR and verification and validation. These elements will nevertheless be integrated in the process design.

A third source for input is also a SE related RWS document. In the advice framework for SE (Dutch: advieskader SE, (RWS, 2014)), a quality assurance framework for tender document (Dutch: kwaliteitsborging
aanbestedingsdossiers of KAd) is described. Central in this framework is the phasing based on respectively 10%, 50-70% and 95% progress meetings.

A last source for input is the collection of control measures that has been put together by Covas Jorge (2016). Not all suitable control measures are directly incorporated in the process design. This is deliberately chosen by the researcher because a process that forces project managers or team members to commit to more than 30 control measures is not likely to be pleasantly received and implemented. Therefore it is aimed to design a process that provides project managers and team members with possibilities to monitor and steer the pre-award phase, while not deviating too much from the current company structures. An alternative process design in which the suitable control measures are directly linked to steps in the process can be found in Appendix I.

6.2 Conceptual framework

Figure 6-1 shows the process that has been designed. There is a clear division in time slots in the process. This division is framed via five client meetings. In between the client meetings, the focus of both project manager and project team should be on a particular project aspect. These aspects correspond to the problem areas defined in Part III of this research.

The first meeting in the process is the kick-off or 0% meeting. This meeting is directly derived from the ‘regular’ BVP method of working in the pre-award phase. Prior to this meeting, the vendor submits his proposal that includes the key activities and a budget estimation. At the kick-off meeting, client and vendor briefly discuss the deliverables from the assessment phase. The main goal of this meeting is to identify the project mission and align project and business goals. This also means that client and vendor need to align their intentions and goals for the project. Alignment of goals at an early stage in the process should prevent disagreement issues later.

In between the kick-off and 20% meeting most of the thinking (at the vendor’s site) takes place. Little PMP content is produced at this stage. Instead of producing content for the PMP, the vendor needs to determine a strategy and planning for the pre-award phase and a scope expressed as an in/out list. It is especially important to determine a phase planning and not only a project planning. In the phase planning, activities needed to complete the PMP are included. This provides the team with a clearer idea of what needs to be done in order to complete the pre-award phase. It will make the pre-award phase less chaotic and the project manager can monitor if the progress of the phase corresponds to the phase planning. This way, he or she can take corrective action of needed. The project manager also needs to think of a format for the WRR. This WRR will take central stage in the rest of the pre-award phase.

The most important deliverables at the 20% meeting are the in/out list, a format for the WRR and a phase planning. These deliverables will be discussed at the meeting. It is especially important that client and vendor reach an agreement about the in/out list at an early stage because as long as the scope is unclear, the vendor cannot precisely determine which activities are needed to complete the project. Reaching agreement about this is therefore the main goal for this meeting.

In the period between the 20 and 50% meeting, structure and integration are the most important aspects. The project team needs to think of a project planning, Work Breakdown Structure, Product Breakdown Structure and conduct a thorough risk assessment for the whole project which includes the risks that have been
identified by the client. The project manager must determine an Organisational Breakdown Structure and think of ways for validation and verification of the PMP. The project manager must also make up two WRRs in order to track progress and communicate this to the rest of the project team.

At the 50% meeting four of the total eight weeks have passed. Client and vendor need to reach agreement about the WBS, OBS, PBS and project planning. The verification and validation methods can be discussed at this meeting. Based on the two WRRs, the progress of the phase is discussed.

After the 50% meeting, the project team needs to put effort in actually writing the content of the PMP. Based on the WBS, OBS and PBS, the content is divided amongst team members. The project manager is responsible for making the WRRs and verification and validation of the content of the PMP. At this stage the project manager is also responsible for determining whether or not the project budget and strategy (for project execution) needs to be adapted. This decision can be based on the WRRs or findings of the project team.

At the 90% meeting the content of the PMP is discussed. The client can make final suggestions and can respond to the findings of the WRRs. If the project manager suggests any changes in project budget and execution strategy, agreement about this must be reached at this meeting.

The comments from the client at the 90% meeting can be processed by the project team in anticipation of the final 100% meeting. When the PMP is finished it is sent to the client for a final assessment. The project manager guides the last finalization step of the PMP and prepares a proper pre-award phase close-out which includes a concise phase evaluation.

If the PMP is completely finished, the 100% meeting takes place. If both parties agree to continue to the execution phase together the contract is signed. By signing the contract, the project is definitively awarded to the vendor. When the contract is signed, the rest of the meeting can be used to discuss the pre-award phase in an informal setting.

6.3 Weekly Risk Report

As stated in the previous paragraph, the WRR plays an important role in the designed process. The WRR is in this case not only used as a risk report for the risks in the risk file, but should also monitor cost and time of the pre-award phase itself. Monitoring cost and time throughout the pre-award phase results in a better insight in the causes of cost and time overruns. The risk of cost and time overruns is therefore decreased. The project manager must spend more time on doing the WRR, but the control over the phase is improved.
Figure 6-1: Process design
The conceptual framework that was designed in the previous chapter will be validated in this chapter using expert judgement. Two project control experts with experience in BVP-projects were consulted. The two experts were asked several questions to rate the conceptual framework. The outcomes of the expert judgement are described in this chapter. The complete expert interview transcripts can be found in Appendix K.

7.1 Expert judgement

For the expert judgements, respondents needed to be chosen that have not participated in the research so far. The two respondents below have been selected because they were closely involved and assisted the project managers of the Moorings Boven-IJssel and Beatrix sluices project. Because of this, they can add relevant information about the usability of the process design. Both respondents have worked at Witteveen+Bos for a relatively short period of time. This has both positive and negative influences on the results. The positive effect of consulting relatively new employees is that they are more likely to be open for improvement suggestions from outside the company, their judgement will be more constructive and aimed at improvement. Senior employees with more than 20 years of experience are more likely to work based on their experience instead of procedures from outside the company, this results in a more critical attitude towards the framework. While this could be beneficial, the choice for ‘young’ employees has however deliberately been made. Preceding the expert judgement interviews, the respondents received a concise introduction of the research goal, research outcomes and the process design. The interviews were planned beforehand and lasted for around 45 minutes. The interview started with some personal information questions, of which the answers are collected in Table 4 below.

<table>
<thead>
<tr>
<th>Function</th>
<th>Respondent 1</th>
<th>Respondent 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years at W+B</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Involved in</td>
<td>Moorings Boven-IJssel</td>
<td>Beatrix sluices</td>
</tr>
<tr>
<td>Function in project</td>
<td>Specialist MER and plan studies</td>
<td>Assistant project leader/project control manager</td>
</tr>
</tbody>
</table>

Table 4: personal information respondents

The second part of the expert judgement interviews were about the process design. Both respondents were asked to give their opinion about the following process characteristics:

- Time (division and amount)
- Use of meetings
- Division of tasks
- WRR
- Completeness
- Usability/Applicability

Regarding the time division format, both respondents agreed that a clear division of time within the phase is useful. The main point of discussion is the 20% meeting because the respondents stated that it is not feasible
to determine a definite in/out list by the time the 20% meeting takes place. The final in/out list should be based on the work package description which takes more than two weeks to complete. Also, one of the respondents stated that there should be a possibility to make adaptations to the list at a later stage in the pre-award phase. The eight week amount of time is agreed by both respondents.

The meetings are perceived as useful to align the expectations of client and vendor. Especially the meetings until the 50% are useful because until that point the main outline of the project is determined and the possibilities to steer are much greater. The first 50% is therefore believed to be the most important. Note that this corresponds to the findings in Chapter 2 that front-end development is crucial. One of the respondents stated that the kick-off and 20% meeting can be merged to a single meeting and held after one week because they are quite close to each other and if one takes into account the time required to read and assess the deliverables, (too) little time remains for the vendor to produce those deliverables.

The division of tasks between project manager and project team is not clear according to the respondents. It is not clear what is meant by project team. In practice, the PMP is written by the core team, consisting of a project, surroundings/environmental, technical, contract and project control manager. They define the course of the project, the in/out list and are responsible for the PMP. Specialist W+B employees are consulted for input (especially for the work packages description) and are considered as support staff in the pre-award phase. This division of tasks is clear in practice, but not in the process schedule.

Whether or not to keep a WRR during the pre-award phase is a point of discussion. Respondent 1 stated that at the Moorings Boven-IJssel project, the project manager kept a WRR during the phase. He suggested that making a WRR during is useful, but should not be required on a weekly base. Two reports are believed to be enough for the whole pre-award phase. They should be made in between the 20-50% and 50-90% meetings. Respondent 2 did not agree with this. She stated that keeping a WRR is only useful when the project scope has been definitively determined. Because the pre-award phase is used for scoping, keeping a WRR would not be of any use.

According to the respondents the process was not complete. One of the respondents suggested to include the results of the workshop of the research phase. The workshop results could be used as a checklist to see whether or not the PMP addresses the six elements determined by the workshop attendants. A plan for integral quality control and determination of Key Performance Indicators was also missing. One of the respondents also pointed out that it would be nice to see which elements of the process are formally required by RWS.

The respondents agreed that the main outline of the process is helpful and usable for project managers and/or the core team. It provides a backup on which they can base their project specific approach. The specific content for every PMP is unique and that requires a slightly different approach for each project. The final suggestion of one of the respondents was to clarify the importance of this process design to the core teams by showing them that cost and time overruns occur frequently in the pre-award phase and that this process can possibly prevent or reduce this. The most important improvement suggestion was to change the division of tasks because the suggestion in the designed process schedule differs too much from practice.
7.2 Modifications to conceptual model

Based on the expert judgements, the model is modified. The modifications will be explained in this paragraph. The comments that have been taken into account during the model modification are briefly discussed. The time period of eight weeks was confirmed by the respondents, but both respondents stated that two weeks was not enough to determine the scope and that the time that is needed for assessment of deliverables can become problematic. These comments resulted in bringing the 20% meeting one week forward (making it a 10% meeting) and postponing the determination moment for the scope. At the 10% meeting only the strategy, phase planning and the 90% scope are discussed. These do not need to be officially submitted to the client but will be discussed at the meeting. This way, the vendor is forced to think about a strategy, phase planning and scope without having to make definitive decisions. With the forward bringing of the 10% meeting, also more time is created for assessment of deliverables for the 50% meeting.

The task division has changed because the process is designed for the core team and the PMP is written by the complete core team with input from specialists at the company. Input from specialists, such as the work package descriptions, is not included in the process schedule.

Less WRRs are required to be handed in. It is chosen not to completely let go of the WRRs because reporting progress and risks can provide useful information for both client and vendor. Future problems might also be detected at an early stage, which provides the core team with the possibility to anticipate on this.

The suggestion to link the outcomes of the workshop to the process schedule is partially taken over (Table 5). The added value of the ‘Vision’ element is already safeguarded in the process by the project kick-off and 10% meeting. From the ‘Teambuilding’ element, aligning internal expectations will be added to the process. The ‘PMP as Contract Document’ element contains scope definitions, an in/out list and a risk file, which are all already included in the process. For ‘Internal Guidance’ the KPIs are taken from the workshop outcomes and included in the process. The KPIs have also been specifically mentioned by the respondents. ‘Information/Assumptions’ is included in the process in the planning, WBS and method for verification and validation. From the ‘Client/Trust’ element, the discussion about approach is included in the process at the first meeting. Environmental/surroundings management are missing, and the same goes for external cooperation and quality assurance. Quality assurance is merged with verification and validation in the process. These elements combined form the suggested ‘integral quality control’. External cooperation is added.

The formally required process elements are: goal, project team organisation, WRR, planning and risk management plan. One meeting per four weeks is required. The six required elements and the 50% are marked with an asterisk. The modified process design is illustrated in Figure 7-1.

<table>
<thead>
<tr>
<th>Workshop Outcome</th>
<th>Translation into process design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision</td>
<td>Kick-off, 10% meeting</td>
</tr>
<tr>
<td>Teambuilding</td>
<td>Align expectation</td>
</tr>
<tr>
<td>PMP as contract document</td>
<td>Scope definition, risk file</td>
</tr>
<tr>
<td>Internal Guidance</td>
<td>KPIs</td>
</tr>
<tr>
<td>Information/Assumptions</td>
<td>Planning, WBS, verification &amp; validation and integral quality control</td>
</tr>
<tr>
<td>Client/Trust</td>
<td>External cooperation, discuss approach</td>
</tr>
</tbody>
</table>

Table 5: Workshop outcomes included in process design
Figuur 7-1: Modified process design
7.3 Implementation

Although the final process model has been modified based on the recommendations of W+B experts, it is not feasible to implement the process directly into all of W+B’s BVP projects. Every project is by definition unique, so developing a process and implementation plan that is applicable to all BVP projects is nearly impossible. However, aligning expectations and developing a global project outline is something that can prove valuable in almost every project. Providing guidance for project managers and their core teams and ‘force’ them to align those expectations with the client before any PMP content is developed is therefore believed to affect the project’s outcome positively. A phased implementation is therefore suggested.

First, the need for improvement must be made clear to the employees. This can for instance be done in BVP courses or by organising an internal team meeting before every BVP project. The proposed process design is not yet part of the W+B DNA, so its importance and goal must be made clear. Otherwise, it is not likely that the process, or even a part of it, will be implemented. It may be wise to form a team of interested and influential people at the company to guide the change throughout the organisation. Again, the BVP courses form a great starting point for gathering such a team. By making it a team effort, change is more likely to be achieved and the plan is more likely to be supported by the rest of the organisation.

When the process itself is implemented, it is advisable to include a concise introduction with the process schedule in order to explain the urge for a structured process. The executive summary at the beginning of this thesis can for instance be used. At first, the core teams might only keep the 10% meeting and discussing strategy with the team members of client and vendor. A project manager can start by keeping a WRR just once in between the 50 and 90% meeting. When both the W+B employees and the client teams are used to keeping the extra meetings, more and more elements can be implemented. The goal must however be to implement the process thoroughly. This is also where a ‘change team’ could be useful. Changing the behaviour of people within the organisation might not be easy and employees are therefore likely to only pick a few elements, which suit their approach, out of the process design. This is however not enough to accomplish the desired change. Eventually, the project manager should monitor the progress of the pre-award phase almost continuously so that he can take action when the phase is off track. Following a structured process, making a phase planning, determining the scope at an early stage and keeping the WRR facilitates this kind of monitoring. Therefore, the change team must indicate the need for improvement, especially when employees are tempted to pick only the elements that they are familiar with and fall back into old habits for the rest.

This implementation plan provides an answer to the third research sub-question: How can an engineering company move from the current towards the desired situation? Engineering companies must be able to monitor their progress and performance in the pre-award phase, in order to be able to move from the current to the desired situation. Monitoring of the pre-award phase is only possible when a project manager and his core team have a standard process, a phase planning, a determination of scope, a WRR or the like available. The WRR is particularly applicable because it is also used during the execution phase. This way, an integrated control system exists in both pre-award and execution phase.
PART FIVE

CONCLUSION AND RECOMMENDATION
CONCLUSION AND RECOMMENDATIONS

In the last part of this thesis final conclusions will be drawn. These conclusions provide an answer to the main research question that was asked at the beginning of this research. When the conclusions have been drawn, some recommendations for future research will be done.

8.1 Conclusion

At the beginning of this research, the following question was asked:

How can an engineering company improve control over the pre-award phase of BVP projects?

To increase the feasibility of finding a comprehensive answer to the main research question, it was split up into three sub-questions each of which addresses one of the focal points of the research. In the previous chapters, the three sub-questions have been answered individually. In this concluding chapter, the answers to the sub-questions are combined in order to answer the main research question.

The first research sub-question was aimed at defining how project control is embedded in Best Value Procurement and in particular in the pre-award phase. The theoretical framework learned that in the pre-award phase a PMP is drafted. The Project Management Institute (2013) illustrated that a PMP serves as a base for controlling a project. The PMP produced in the pre-award phase is therefore crucial in controlling a BVP project. Project control is specifically embedded in the pre-award phase.

After the connection between project control and the pre-award phase was made clear, the second sub-question focused at problems that arose from the gap between the current and desired situation. In the research phase, the current situation has been extensively investigated. The interviews, workshop and document review resulted in a total of five ‘problematic’ project aspects; scope, time, cost, strategy and integration. In the current situation, W+B struggles to control these aspects in the pre-award phase. In a desired situation, W+B would be able to control all project aspects. The problem is therefore that the five project aspects cannot be controlled.

The process schedule that is designed in part four of this research provided a suggestion for engineering companies to move from the current to the desired situation. The process is aimed at improving control over the five problematic project aspects and is designed to stimulate early thinking in the pre-award phase while the writing of content is postponed till after the 50% meeting. Monitoring progress and performance is key when engineering companies want to move towards the desired situation. A standard process, phase planning, determination of scope, or a WRR can be used.

Now that the three research sub-questions have been answered, the main research question can also be answered and a final conclusion can be drawn. The pre-award phase is crucial in controlling the execution phase of BVP projects because the produced PMP provides a well-founded base for progress and performance monitoring by the project managers of the client and vendor through the WRR. However, engineering
companies struggle to control the pre-award phase. This manifests itself in five project aspects that engineering companies do not seem to have control over and is caused by the fact that there is no standard process or other document that can be used as a reference for progress and performance monitoring. In the proposed process design, scope and strategy find their place in the first week of the pre-award phase. The integration of elements is included between the 10% and 50% meeting. Cost and time control are covered throughout the whole process because the risks and progress of the project are monitored by the project manager. Without monitoring, the project control cycle cannot be completed. Engineering companies can therefore improve control over the pre-award phase by either implementing the proposed process schedule or even using elements of this particular process schedule.

8.2 Recommendations

The process must be developed further. The expert judgements are considered a first iteration step, but the process needs continuous development in order to improve the process and keep it up to date. As a first step it is advisable to test the framework in a pilot project. Due to time limitations, applying the process design in a pilot project for testing was not feasible in this research. Experiences of applying the process in a real project would yield a lot of useful information that can be used for improvement. Testing the process in a (pilot) project can also determine if the process works at all. The main recommendation is therefore to apply the process in a future BVP project.

It would also be nice to see whether a larger group of respondents comes to the same conclusions about the process design. With a larger group of respondents, it becomes harder to implement each individual comment into the process schedule, but it would certainly benefit the validity of the process design. At W+B, the process can be evaluated for instance in BVP courses. This would evoke discussions about the process design which, if processed properly, will benefit the process as well.

Besides improvement of the process design, implementation in a pilot project and discussion about the process design would also benefit Witteveen+Bos as a company. The findings in the research phase, the lack of structure and strategy in the pre-award phase are both alarming and surprising. Especially for a company that executes such a large amount of projects on a yearly basis. Two of the four projects that were included in this research encountered serious cost or time issues. This amount can be reduced if projects are executed more structured and if their progress is monitored more closely. The proposed process design can really help taking the first step here. Discussion about the process would make employees more aware of the existing problems and implementation in a pilot project could show immediate results.

Finally, for future research, a fit for purpose model could be investigated. The elaborated process design in Appendix I includes a selection of control measures that can also contribute to improved control over the pre-award phase. These control measures should first be assessed by a number of experts in that field to see whether they have potential to contribute in practice. It would be nice to see some kind of validation of these control measures and definition of success criteria linked to the process design.
LIMITATIONS AND REFLECTION

The last chapter of this research discusses the limitations of the research and contains a personal reflection. This chapter provides a context in which the research has been performed.

9.1 Research limitations

The outcomes of this graduation research are primarily based on four projects. If a larger selection of projects could have been taken into account, the problems within the pre-award phase could have been defined more precisely. This could lead to a process design which is more specifically focused on one particular aspect within the phase. Also for scientific purposes, more projects would positively contribute to the relevance of this research.

Another limitation of the research is that the client perspective is currently lacking in the process design. Although the most important sources of input were RWS documents, no client expert has been asked to review the process design. Involving the client in the process design would result in a process that suits the demands of both parties even better.

Furthermore, unconventional project management methods like Lean and Agile are not included in the research. Taking into account these methods could provide different results and influence the research outcome.

As stated in the previous chapter, time limitations made it not feasible to test the process design in a pilot project. Testing the process in ‘real-life’ would have added a lot to the validity of the process.

9.2 Personal reflection

This graduation research has really challenged me. It was challenging working on a project for almost eight months all by myself. The results of the research differed from my expectations at the beginning of this research. The control measures are not completely investigated on their usability within the company while I expected to find a short list of measures that would help Witteveen+Bos to control the pre-award phase. At the start of this research it was assumed that a current process could be identified within a reasonable amount of time. Because a process structure was lacking, the research encountered some delay and the control measures had to be compromised.

For the progress of the research it would be better if I had drawn conclusions from the research phase earlier. When the outcomes of that phase pointed out that there currently was not a structured process that was followed, the setup of the research changed. If that change had taken place at an earlier stage, the research could have gotten further. A pilot project in which the process design was applied could have been within reach whereas that was not feasible now.
What has been striking during the entire research was that the struggles encountered in the research proved the problem statement and made clear the need for solid front-end project development. The problem statement was therefore also valid for this graduation research and the need for front-end development also exists in research projects. If one compares the proposal that needs to be handed in at the kick-off meeting for graduation to the PMP that engineering companies need to hand in at the end of a pre-award phase, my struggles with drafting the proposal caused problems during the rest of the project. The experiences in the project have certainly been confronting. It quickly became clear that the shortcomings in the preparation of the research could cause problems during the rest of the project. This however provided knowledge about and experience with doing research which I believe is also very valuable.
10  REFERENCES


Rijt, J. (2016). *Best Value Werkt*.


## APPENDICES THESIS

### A Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BVA</td>
<td>Best Value Approach</td>
</tr>
<tr>
<td>BVP</td>
<td>Best Value Procurement</td>
</tr>
<tr>
<td>CRS</td>
<td>Client Requirement Specification</td>
</tr>
<tr>
<td>FED</td>
<td>Front End Development</td>
</tr>
<tr>
<td>OBS</td>
<td>Organisational Breakdown Structure</td>
</tr>
<tr>
<td>PBS</td>
<td>Product Breakdown Structure</td>
</tr>
<tr>
<td>PCP</td>
<td>Pre Construction Planning</td>
</tr>
<tr>
<td>PM</td>
<td>Project Manager</td>
</tr>
<tr>
<td>PMBOK</td>
<td>Project management body of knowledge</td>
</tr>
<tr>
<td>PMC</td>
<td>Product Market Combination</td>
</tr>
<tr>
<td>PMP</td>
<td>Project Management Plan</td>
</tr>
<tr>
<td>RWS</td>
<td>Rijkswaterstaat</td>
</tr>
<tr>
<td>W+B</td>
<td>Witteveen+Bos</td>
</tr>
<tr>
<td>WBS</td>
<td>Work Breakdown Structure</td>
</tr>
<tr>
<td>WRR</td>
<td>Weekly Risk Report</td>
</tr>
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### B Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Dutch Term</th>
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<tr>
<td>Best Value Procurement</td>
<td>Prestatie-inkoop</td>
</tr>
<tr>
<td>Client</td>
<td>Klant of opdrachtgever (OG)</td>
</tr>
<tr>
<td>Contractor</td>
<td>Aannemer</td>
</tr>
<tr>
<td>Pre-award phase</td>
<td>Concreiseringfas</td>
</tr>
<tr>
<td>Tender</td>
<td>Offerte of aanbieding</td>
</tr>
<tr>
<td>Vendor</td>
<td>Opdrachtnemer (ON)</td>
</tr>
<tr>
<td>Weekly Risk Report</td>
<td>Weekrapportage of wekelijkse risico rapportage</td>
</tr>
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</table>
## C. Witteveen+Bos Organizational Chart

<table>
<thead>
<tr>
<th>DIRECTIE</th>
<th>SECTOR GEBOUWDE OMGEVING</th>
<th>SECTOR DELTA'S, KUSTEN EN ENTREPRISE</th>
<th>SECTOR ENERGIE, WATER EN MILIEU</th>
<th>SECTOR INFRASTRUCTUUR EN MOBILITEIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>dr. G.J. Stip (Kap)</td>
<td>dr. J.J.A.M. Oud (Denmark)</td>
<td>e. Dr. H.J.M.A. Mols (Utrecht)</td>
<td>dr. J.J.M.A. Mols (Utrecht)</td>
<td>dr. R. de Boer (Rotterdam)</td>
</tr>
<tr>
<td>NEDERLAND</td>
<td>PMC Gebiedsontwikkeling</td>
<td>PMC Ecologie</td>
<td>PMC Water</td>
<td>PMC Water Infrastructure en Milieu</td>
</tr>
<tr>
<td></td>
<td>ing. M. Miel (Utrecht)</td>
<td>dr. M. Krog (Rotterdam)</td>
<td>ing. J.H. Kramer (Rotterdam)</td>
<td>ing. J.W. Amer (Rotterdam)</td>
</tr>
<tr>
<td></td>
<td>dr. G. Jolles (Delft)</td>
<td>dr. G. Jolles (Delft)</td>
<td>ing. J.H. Kramer (Rotterdam)</td>
<td>ing. J.W. Amer (Rotterdam)</td>
</tr>
<tr>
<td></td>
<td>PMC Activiteiten</td>
<td>PMC Water en Milieu</td>
<td>PMC Water en Milieu</td>
<td>PMC Geenbroeders en Verenigingen</td>
</tr>
<tr>
<td></td>
<td>ing. J.H. Kramer (Rotterdam)</td>
<td>ing. J.H. Kramer (Rotterdam)</td>
<td>ing. J.H. Kramer (Rotterdam)</td>
<td>ing. J.H. Kramer (Rotterdam)</td>
</tr>
<tr>
<td>AFRIKA, EUROPA EN AMERIKA</td>
<td>Residu infrastructuurst</td>
<td>PMC Water en Infrastructuur</td>
<td>PMC Water en Infrastructuur</td>
<td>PMC Water en Infrastructuur en Milieu</td>
</tr>
<tr>
<td>e. H.P. Lagaye (Porthcawl)</td>
<td>ing. J.W. Amer (Rotterdam)</td>
<td>ing. J.W. Amer (Rotterdam)</td>
<td>ing. J.W. Amer (Rotterdam)</td>
<td>ing. J.W. Amer (Rotterdam)</td>
</tr>
<tr>
<td>CIS LANDEN</td>
<td>PMC Water en Infrastructuur</td>
<td>PMC Water en Infrastructuur</td>
<td>PMC Water en Infrastructuur</td>
<td>PMC Water en Infrastructuur en Milieu</td>
</tr>
<tr>
<td>MIDDEN OOSTEN</td>
<td>PMC Water en Infrastructuur</td>
<td>PMC Water en Infrastructuur</td>
<td>PMC Water en Infrastructuur</td>
<td>PMC Water en Infrastructuur en Milieu</td>
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<tr>
<td>e. W.E. O. Bij (Wouzelt)</td>
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<td>ing. J.W. Amer (Rotterdam)</td>
<td>ing. J.W. Amer (Rotterdam)</td>
<td>ing. J.W. Amer (Rotterdam)</td>
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<td>TUS OOSTZEE EN AUSTRALIE</td>
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<td>PMC Water en Infrastructuur</td>
<td>PMC Water en Infrastructuur</td>
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<td>ing. J.W. Amer (Rotterdam)</td>
<td>ing. J.W. Amer (Rotterdam)</td>
<td>ing. J.W. Amer (Rotterdam)</td>
</tr>
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</table>

Source: [http://www.witteveenbos.nl/nl/organisatiestructuur](http://www.witteveenbos.nl/nl/organisatiestructuur)
### D: Control Measures grouped per area

<table>
<thead>
<tr>
<th>Control Area</th>
<th>Project controls</th>
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## E: BVP Project Overview

<table>
<thead>
<tr>
<th>nr.</th>
<th>naam</th>
<th>opdrachtgever</th>
<th>omduiding</th>
<th>persoon W4B</th>
<th>wanneer</th>
<th>opdracht?</th>
<th>beoordeling</th>
<th>evaluatie</th>
<th>Rovplan</th>
<th>off kosten</th>
<th>proj omvang</th>
<th>% a.k.p.o.</th>
<th>Opmerkingen</th>
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<tbody>
<tr>
<td>1</td>
<td>EBA</td>
<td>RWS</td>
<td>planstudies Bouw besides</td>
<td>MUL, MULINJ</td>
<td>2010</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>MULINJ ongeëerd</td>
</tr>
<tr>
<td>2</td>
<td>Beetklooi</td>
<td>RWS midden NL</td>
<td>planstudies Bouw besides</td>
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<td>2012</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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<td>2011/12</td>
<td>nee</td>
<td>ja</td>
<td>nee</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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<td>9% hoogste op alles behalve prijs</td>
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<td>4</td>
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<td>MONH, WORT</td>
<td>2011</td>
<td>ja</td>
<td>nee</td>
<td>nee</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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<td>geledingsanering</td>
<td>KROG, BLEID, KRAJ</td>
<td>2012</td>
<td>ja</td>
<td>nee</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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</tr>
<tr>
<td>6</td>
<td>PULGZ3</td>
<td>RWZ DI</td>
<td>idee</td>
<td>KROG, BLEID</td>
<td>2014</td>
<td>nee</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>3% Zie mail voor verslag mondelinge evaluatie</td>
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<td>2012/12</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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<td>KRAJ</td>
<td>2013/14</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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<td>10% KRAJ stuit stukken</td>
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<td>2013</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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<tr>
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<td>NWKO (Blankenburgverbinding)</td>
<td>RWS ZH</td>
<td>planstudies en contract</td>
<td>LIND</td>
<td>2013</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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</tr>
<tr>
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<td>planvoorbereiding</td>
<td>LAAH, MUL</td>
<td>2013</td>
<td>ja</td>
<td>ja</td>
<td>nee</td>
<td>ja</td>
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<td>ja</td>
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<tr>
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<td>N23 Westfriesevaag</td>
<td>provincie Noord Holland</td>
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<td>BUUG</td>
<td>2011</td>
<td>nee</td>
<td>ja</td>
<td>nee</td>
<td>ja</td>
<td>ja</td>
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<td>ja</td>
<td>7% Zie mail BUUG voor toelichtingsavaliatie</td>
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<td>14</td>
<td>RVSZ Beamter</td>
<td>HNKH</td>
<td>realisatie voortbreiding</td>
<td>KRAJ</td>
<td>2013</td>
<td>nee</td>
<td>ja</td>
<td>nee</td>
<td>ja</td>
<td>ja</td>
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<td>ja</td>
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<tr>
<td>15</td>
<td>Voorbereiding N279 Noord</td>
<td>provincie Noord Brabant</td>
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<td>CASE</td>
<td>2013</td>
<td>nee</td>
<td>nee</td>
<td>nee</td>
<td>nee</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>13% Reeds gemail naar KONJ, Jaap gaat dit na</td>
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<td>16</td>
<td>Afsluiting (pseudobp)</td>
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<td>planvoorbereiding</td>
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<td>2013</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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<td>A13AI16 (pseudobp)</td>
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<td>2013</td>
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<td>planstudies</td>
<td>SCHF</td>
<td>2013</td>
<td>ja</td>
<td>nee</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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<td>2014</td>
<td>ja</td>
<td>ja</td>
<td>nee</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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<tr>
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<td>A27 Ring Utrecht</td>
<td>RWZ</td>
<td>Planuitvoering</td>
<td>DAES, HOLE2</td>
<td>2014</td>
<td>nee</td>
<td>nee</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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<tr>
<td>21</td>
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<td>RWZ</td>
<td>Planstudies</td>
<td>HOLE2, HELAZ, BOE</td>
<td>2014</td>
<td>nee</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
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<tr>
<td>22</td>
<td>Meijerjarenplan gebied</td>
<td>Pterfall</td>
<td>Planstudies</td>
<td>DNE2, DLE2</td>
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<td></td>
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<td>indien ontvangt 3-4-2015</td>
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<td>23</td>
<td>Ligplaatsen in de Reuven-Loge</td>
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<td>2015</td>
<td>ja</td>
<td>ja</td>
<td>nee</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>ja</td>
<td>20%</td>
</tr>
<tr>
<td>24</td>
<td>A2 Vorderen - Kersenheide</td>
<td>RWZ</td>
<td>Planuitvoering</td>
<td>HOLE2, Offerte loop</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
F: Pre-award Phase Interview

Gain insight in the current way of working in the pre-award phase in order to draw the current state map.

Definition:
Pre-award phase of BVP projects is the phase in between conditional award and definitive award.
Current state map is part of Value Stream Mapping methodology.

Part A: Personal Information
Name: __________________________________________________________
Function: _________________________________________________________
Educational background: _____________________________________________
How long at Witteveen+Bos: __________________________________________

Part B:
Closed Questions
Do you have experience with pre-award phase of BVP projects: ____________________________
Which project(s)? ___________________________________________________
Who was the client? _________________________________________________
How much time for the pre-award phase? _______________________________
How much people were working on the PMP? _____________________________
And how was the team composition? ___________________________________
Did you follow the BVP course at Witteveen+Bos? _______________________

Open Questions
What is your experience with BVP projects? (positive, negative, ambiguous) __________________________
Did you find the pre-award phase useful? Why? _________________________

Which requirements did you get from the client at the beginning of the pre-award phase?
________________________________________________________
________________________________________________________
________________________________________________________

What documents/information did you receive from the client as input data?
________________________________________________________
________________________________________________________
________________________________________________________

What documents were produced in pre-award phase?
________________________________________________________
________________________________________________________
________________________________________________________

How do you plan the necessary activities in the pre-award phase?
________________________________________________________
________________________________________________________
________________________________________________________

Was there a strict planning?
________________________________________________________
________________________________________________________
________________________________________________________

Were you satisfied with the results? And the client?
________________________________________________________
________________________________________________________
________________________________________________________

How did you evaluate the results?
________________________________________________________
________________________________________________________
________________________________________________________
What is your experience with the BVP approach?

1. “There are two difficulties in BVP: a) pre-award phase is essentially a scoping phase but RWS does not agree because they believe that an agreement is made based on goals. b) BVP assumes that only WB is expert, while RWS is also an expert in certain fields, such as stakeholder and surroundings management. It is very important in BVP to make clear who is expert in which field. This requires good communication!

The Beatrix sluices and A9 were good examples of BVP projects, because RWS had organized the project well internally, for the Blankenburg connection, it was much harder.”

2. “It can work rather well, especially the division of expert roles, and a PMP is less project specific. What I mean with that is that when there is no clear PMP, the focus is all on the content of the project and clients these days want to see more than that. I think BVP like projects will become more common because the way of working is applicable on a wide range of projects and the division of expert roles is something that is very interesting.”

3. “I was project manager in the Blankenburg project, but the pre-award phase didn’t go as well as we wanted. There are three reasons why: a) Team RWS wanted to cooperate instead of trusting W+B with the expert role, they were informed that it was a BVP project only one month in advance. b) WB had completed the Beatrix sluices (BVP) successfully, but Blankenburg connection was much more complicated. c) There was an inexperienced WB team.

I also learned three things: a) We would have wanted more insights in the decisions that RWS had to take and which information they needed to do so. b) The PMP has become very extensive, we let ourselves be dragged on by RWS so it was too detailed and merely used afterwards. c) Next time, I want to steer even more based on risks.”

4. “In essence, I’m a proponent. BVP provides a good division of risks and expertise. But it is still an instrument in development. Clients find it hard to relinquish everything, and it is hard for WB to take the full lead. In the end, projects cannot be realized without interaction and cooperation. BVP is a risk-steered method, but parties need to handle residual risks together so cooperation is still based on trust. The PMP helps, because it provides insights to the client about how the engineering company manages risks.

W+Bs trust in RWS is very situational and depends on team composition and willingness to work BVP-like. When you have an old-school project leader, it won’t work.”

5. “The BVP approach has its up- and downsides. The way of selecting vendors, based on other ways than price is a big plus. Risks and chances demand another approach than price based tendering. Another advantage is the important role of interviews in the procurement process, and the different ‘filter layers’ are also very pure and nicely divided. Downsides of BVP are that is sometimes seen as the most ideal model, which is not the case for every project. Another possible downside is that BVP is a generic procurement method, not specifically focused on the construction sector.”

6. “Positive, I like the idea of having responsibility for the content as a vendor.”

Do you find the pre-award phase useful?

1. “Well, the PMP is a useful instrument after definitive award. It serves as starting point of conversation about two things: scope and task division. So the goal of the pre-award phase is useful.”

2. “If the goal of the pre-award phase is making the PMP, then yes. But I especially see the use of the PMP itself and not of a particular phase in which we should make it.”

3. “Yes, although it didn’t went perfectly well, it became very clear that we wanted to steer projects based on those risks from now on. So the phase creates a sort of consciousness about what’s important in a project and what’s not.”

4. “I’m also a proponent of the pre-award phase, but in practice, it is never finished after 8 weeks. It takes time to level expectations, what’s in and outside the scope and risks. Negotiation remains necessary and that takes time. Ambition exists to make the whole process more efficient. But we make PMPs way to extensive.”

5. “The pre-award phase has become better. The setup of the phase is excellent, but still, some improvement can be made. It must be made clear when the phase ends, which products are required and on which detail level. This can cause some problems.”

6. “Yes, the accents are in the right place, and there are less. And if you don’t win a project, you don’t have to put too much effort in it.”

Were client requirements clear?

1. “We received the Client Request Specification at the beginning of the phase, but we already had the shadow tender. Basically we only needed to expand the shadow tender in order to match it to the CRS.”

2. “For the Blankenburg connection, they were not very clear.”

3. “A list of requirements of the PMP is described in the tender specification. The crux is the level of elaboration.”

4. “Well, if I was involved in such a project, first we would need to decide together when the delivery date would be, that can’t go without negotiations. In the client request specification, a set of requirements regarding the project and process is given. Basically, the pre-award phase is a very long project start up. It forces the vendor to think twice before starting.”

5. “Yes, we received the requirement specification.”

What information was available at the start of the pre-award phase?

1. “A lot, we received a complete overload of unstructured information. After conditional award, RWS hands over all documents they have produced so far.”

2. “What we received from RWS: a) 180 documents on a dvd b) Preferred Track Decision c) very detailed information. In an ideal situation we would have wanted to receive: x) a structured client request dossier (KES) y) the discussions that led to the preferred decision and z) openness in information.”
4. “Requirement specification and a lot of info about the preliminary stage. All that info has to be translated in order to be useful in pre-award phase.”

6. “A whole bundle of information, 23 boxes of drawings. But how are you going to select which of that information is useful and which is not? What you actually want is more explicit information about interfaces and more transparency about risk information and the risk file.”

Which documents were produced during the pre-award phase?

1. “A 90% version with a few points of discussion.”

3. “A very comprehensive PMP.”

4. “Mainly the things that are described in requirement specification. But in some cases we have made sub-plans. In the Moarings Boven-IJssel project, we did a stakeholder meeting in the pre-award phase, this caused a scope change in the pre-award phase and lots of extra work.”

6. “A project management plan. 1 main document and 3 subplans which are updated for every design loop.”

Was it easy to oversee the necessary activities in the pre-award phase?

1. Yes, in fact, most of the activities are already executed because you made the shadow tender. It is a matter of elaborating those plans.

3. No, not really, because there were many changes in workload. The PMP has become very extensive because sections were added continuously; this made it hard to predict what we had to do.

4. Yes and no. In general terms, yes. But we could only make a detailed plan for the first design iteration. Drafting the PMP was easy to oversee, we only took too much time.

6. Yes, we divided the phase in 3 phases. First we listened to the reaction of RWS on our tender. Then we processed their comments and then we planned all activities together with RWS. It went very well and was a real pleasant working environment.

Was there a strict planning?

1. No

3. No

4. Planning of the pre-award phase has not been standardized sufficiently. There are some RWS guidelines, but they always need translation. Standardization could be useful here.

6. Yes

Were you satisfied with the results? And the client?

1. With the Blankenburg connection 500.000 euros has been spent in the 3 months pre-award phase, which is a shame because there already is a shadow tender. There was a lot of discussion because RWS assumed participation based on goals, so why would there have to be overhours? Success factors for BVP projects are team composition and the willingness to work according to BVP work style.

3. Not really, mainly because we spent 500.000 instead of 160.000-170.000

4. Mixed answer. I’m satisfied with the PMP that we delivered. It served as a solid base for RWS to see what we were going to do in the next stage and what they could expect from us. The client accepted the PMP, so I guess they were satisfied as well. But again, it took too much time and there were too many process disruptions and scope changes.

6. Yes, we both were.

How were the results evaluated?

1. The client agreed with the PMP for A9 and Beatrix. The Blankenburg project is not yet evaluated.

3. Yet to come

4. Client accepted PMP

6. We have a signed cooperation form and a picture of the project drinks.
G: Workshop results

Workshop results - Leidseplein, Office AS

For this graduation research a workshop is organised in which the participants were given the assignment to map the most important steps/elements for making a PMP. Six W+B employees participated in this workshop. They were divided in three duos and were all given the same assignment. When all duos finished the assignment (after approximately 45 minutes) the results were handed in and the results of the workshop was discussed in a plenary session. The handed in workshop material is summarised below.

Team 1 (Ernst Molier + Rob Nieuwkamer)

Wat is de waarde van het PMP?
- Vertrouwen van opdrachtgever (client) in onze aanpak → gunning opdracht
- Interne sturing van project
  - vastleggen
    - structuur project
    - procedures (SE/Lean)
  - visie → de aanpak van W+B, concreet voor dit project
- verslag maken
- Contractstuk: definitie scope door opdrachtnemer (vendor)

Visie
- kenmerken van de opgave doorgronden
- onze aanpak om deze opdracht
  - efficiënt
  - effectief uit te voeren

GOKITR
- Raakvlakmanagement
- Samenwerken
- Omgevingsmanagement

---

Team 2 (Erik Holtrop + Marcel Wauben)

Doel PMP

Waardev: wat levert dit op?

Ontwikkelpproces zo efficiënt mogelijk (ontwerp)
- Financial result, werkplezier, conform planning, accountable

Taken en verantwoordelijkheden per teamlid vastleggen
- Dat alle werkzaamheden gebeuren

Kostenbeheersing: deelbudgetten, verantwoordelijke
- Binnen budget, financieel resultaat, resource inzicht, opleveren conform planning

Controle systematiek
- Geen waarde, alleen vertrouwen

Ontzorgen OG
- Vertrouwen

Logische planning met voldoende detail, sturing, inclusief planning onderaannemers, OG, omgeving
- Project beheer conform verwachting, goede werkrelatie met alle stakeholders incl. werkspraken

Explicit vastleggen werkprocessen, werkafspraken
- Duidelijkheid naar iedereen wanneer wie wat doet

Organisatie, WBS, afstemming, overleg
- goed start met juiste info, in 1 x goed.

Input info, uitgangspunten vastleggen
- Discussie of het juiste gaat gebeuren

Wijze van communicatie over informatie
- duidelijkheid bij alle stakeholders en werknemers

Toetsing vakinhoudelijk en raakvlakken, vastleggen van kwaliteit
- Levert niets op, vertrouwen

Risico gestuurd werken, integreren
- Efficiënt werken, draagvlak, daar effor in stoppen wat moeilijk is

Hoe omgaan met wijzigingen
- Efficiëntie, transparantie, voorkomen van foute betaling

Ontwerpkeuzes vastleggen
- Communicatie, duidelijkheid naar derden

Raakvlakken vastleggen
- Efficient → integraal product

Productenlijst, opleverdata
- Efficiëntie, doelgerichtheid, overzicht, duidelijkheid wat betaalt wordt

---

Figuur: betrokkenheid W+B in levenscyclus project

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9 | Appendices MSc. Thesis J.F. Kusters
H: Control measures linked to research phase outcomes

The conclusion of the research phase included five attention areas for the pre-award phase. These areas were the following:

- Scope
- Time
- Cost
- Strategy
- Integration

The literature research of Covas Jorge (2016) resulted in a total of 20 control areas. If the attention areas of the research phase are linked to these control areas, an overview of suitable control measures for the pre-award phase can be created.

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<th>Control Measures</th>
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<th>Time</th>
<th>Cost</th>
<th>Strategy</th>
<th>Integration</th>
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<td>117</td>
<td>Assessing phase and project closeout</td>
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I. Process Design with control measures

- **End of Assessment** < 0%
  - Investigate Client Request Specification
  - If not included in proposal:
  - Determine key activities and milestones
  - Estimate budget
  - Appurtenant control measures:
    (022) (031) (032)

- **Scope & Strategy** 0% < 20%
  - Determine strategy for pre-award phase and understand use of phase
  - Determine Scope (incl. list)
  - Create format for WRR
  - Think about phase planning
  - Appurtenant control measures:
    (011) (013) (014) (016) (017)

- **Structure & Integration** 20% < 50%
  - Think about WBS, OBS and PBS
  - Determine method of verification and validation
  - Think about project planning
  - Conduct risk assessment
  - Carry out WRR x 2
  - Appurtenant control measures:
    (012) (016) (018) (112) (113) (114)

- **Cost & Time Control** 50% < 90%
  - Write most of the PMP
  - Carry out WRR x 3
  - Keep track of time and cost
  - Verify and validate PMP content
  - Adapt project budget and strategy based on WRR
  - Appurtenant control measures:
    (025) (100) (107)

- **Finalize** 90% < 100%
  - Implement comments 90% meeting
  - Proper close out of pre-award phase
  - Appurtenant control measures:
    (014) (117)

**At kick-off meeting:**
- Deliverables: Key activities and milestones, Budget estimation
- Goals: Identify project mission and purpose, align project and business goals
- Control measures (101) (102)

**At 20% meeting:**
- Deliverables: Scope (incl. list), WRR format, phase planning
- Goal: discuss deliverables, reach agreement about incl. list

**At 50% meeting:**
- Deliverables: WBS, OBS, PBS, project planning, WRR x 2
- Discuss Verification and Validation method

**At 90% meeting:**
- Deliverables: Full content of PMP, WRR x 3
- Discuss if content of PMP is enough to propose to 100% meeting, WRRs, project planning and budget

**At 100% meeting:**
- Deliverables: Finished PMP, Contract
- Discuss how the pre-award phase went, are we excited to continue to next phase (informal)
K. Guideline and questionnaire for suggested pre-award phase process

For my graduation research I spent the last months trying to find methods to improve control over the pre-award phase. The aim is to prevent unnecessary cost- and time overruns in this phase. An extensive study into the A9 Amstelveen, Beatrix Sluices, Blankenburg connection and Moorings Boven-IJssel has provided me with the following insights:

- At this moment, there is no standard process or procedure for the pre-award phase
- The results of the PAP of the four projects differ greatly from each other. While one of the projects had to endure cost overruns, another one faced time overruns and again another one had encountered no problems worth mentioning
- The produced PMPs differ greatly from each other, content and structure wise
- The template PMP provided by W+B is not complete

Because there is no clearly defined cause for the problems encountered in the PAP, it was hard to find a way to improve control over the phase. In collaboration with my graduation committee, we decided to focus on the process. The designed process is attached in the email. It is based on a literature research to BVP in general, my research findings and partly to the guideline SE by Rijkswaterstaat. However, a process designed by one person only has little scientific and practical value. I would therefore like to ask you to comment on the process based on the questionnaire below. If there are any questions about the goal of the research or the process, don’t hesitate to contact me.

Personal information

Name:
Function:
Years at W+B:
Involved in which BVP project:
Function in that project:

Process related questions

What do you think of the time format in four parts and meetings in between?
Are these meetings necessary for a proper course of the pre-award phase?

What do you think of the time periods?

Is the division project manager and project team activities clear?

Is it necessary to clarify this division?

Do you agree with the fact that the project manager should keep a Weekly Risk Report during the pre-award phase? Why?

To what extent do you think this process description is complete?

What do you really miss in this process?

Would you, or do you think that a project manager would stick to this process?

Do you have any suggestions for improvement?
Respondent 1:

Name: Joey Willemsen
Function: Specialist MER and plan studies
Years at W+B: 4
Involved in which BVP project: Moorings Boven-Ijssel
Function in that project: Specialist MER and plan study

Respondent 2:

Name: Anke Springer-Rouswette
Function: Project leader planstudies and MER
Years at W+B: 6
Involved in which BVP project: Beatrix sluices
Function in that project: Assistant project leader/project control manager

Process related questions:

What do you think of the time format in four parts and meetings in between?

1: I think it is a good division time wise, and the meetings are very useful to align expectations between client and vendor. We would need clear agendas to define what we are going to talk about in the meetings. What do we want from the client and how are we going to demarcate our plan. I also have my doubts about the sequencing of activities, especially the WBS, which we normally base on work package descriptions, and they take a lot of time to make.

2: I think it's clever to work with this division. I'd rather go for a 10-50-90 instead of the proposed 20-50-90%. The first meeting would then really be about discussing viewpoints, formats and planning. I don't think it's realistic to discuss a definitive in/out table at the first meeting (whether it is 10 or 20%), or is it a RWS requirement? Of course, you have got the main outline from the assessment phase, but I think it would be wise to adapt the in/out list with regards to your WBS. When you have got your work package descriptions, you can define exactly what should be inside and outside the scope of work activities. Anyway, I think additions will be made to the list during the project.

Are these meetings necessary for a proper course of the pre-award phase?

1: Yes, as I said the meetings are necessary to align expectations.

2: Yes, they are very important to align expectations. Especially the 10 and 50% meetings (assumptions and global concept) are very important because at that time you still have the possibility to steer. I think the 10% and kick-off can be combined because they are very close to each other. The 50% might be 'a written meeting' but preferably a real meeting.

What do you think of the time periods?

1: I think eight weeks for the phase would be fine. We thought we could do it in four, but it turned out we needed more than eight. A detailed in/out list is not realistic after two weeks because we base it on our work package descriptions and they take more time. And you need to take into account the time needed for reading the reports. Usually we need to send our documents to RWS one week before the meeting, so than it would become a very tight schedule.

2: The kick-off and 10% can take place after one week, but I think two weeks is realistic for the project start up etc. I would reserve three weeks to get from 10 to 50% and 2 weeks for 50-90. The stage that gets you to 50% is the most important because that's the phase where you need to make choices and determine the main outline.

Is the division project manager and project team activities clear?

1: No, it is not. Who do you mean by project team? The core team (project, surrounding/environmental, technical, contract and project control manager) determines the project outline and is responsible for writing the PMP. They gather information from W+B specialists.

2: I believe the schedule is quite clear, but I would divide the tasks not this way. The PMP is a product that is produced by the core team, where the PM takes the lead. The project control manager also has large responsibilities and the other team members provide input. I would suggest to make the division between core team and other project employees. The PMP mainly describes processes and the PM has an important role in writing this, in the process schedule the support team also writes parts which I believe is strange. In my opinion, the core team writes the main parts of the PMP and the supporting staff provides input in the work package descriptions. The process schedule also suggests that the support team determines what's in and what's out. I think the core team determines that, based on input from the supporting staff. The project leader is responsible for the end result.

Is it necessary to clarify this division?

1: No, I don't think so. The process schedule should be for the core team because they are responsible for the PMP, and this is clear in practice as well. What would be nice is to add work intensity at the different stages.

2: See previous question, and I would add a list of abbreviations.

Do you agree with the fact that the project manager should keep a Weekly Risk Report during the pre-award phase? Why?

1: At Moorings Boven-Ijssel we did it, but not as regularly as suggested in the process schedule. It is nice to practice it in the pre-award phase, but not every week. Perhaps make it once and then practice it twice, for instance in the 20-50% and 50-90% stage.

2: No I do not agree. I believe it's important to have your risk file up to date as a part of the PMP and it seems right to start doing the WRR at the end of the phase based on that risk file, but not throughout the whole phase. In the pre-award phase, you are still looking your project. I think the WRR is a useful instrument when the scope is determined.

To what extent do you think this process description is complete?

1: It would be nice to include the results from the previous research phase, and especially the outcomes of the workshop into this. The determination of KPI's is also important and again the time that is required to assess the deliverables is not included but is important!

2: I think it's pretty complete, but there is still room for discussion how every part fits into the complete process and PMP.

What do you really miss in this process?

1: A list of people that need to be attending the meetings would also be nice, or is it necessary that both teams are present at all meetings, and is there also a BVP advisor present? A last thing that would be nice to highlight things that are formally required by RWS.
A more elaborate quality control. Now there’s only control by the project manager and I think that the complete core team should perform an integral quality control. And at large projects, there should be some kind of external quality control. I still doubt whether the in/out list can be ‘frozen’ at the beginning of the pre-award phase. Shouldn’t there be an adaptation moment and a final moment of determination at 90%?

Would you, or do you think that a project manager would stick to this process?

I don’t think it matters whether project manager will stick to the process. It provides grip and/or support and that’s what counts. I don’t think it’s useful to formally require that every project manager sticks exact to the process.

The main outlines, yes. I believe the 10/20-50-90 line provides a solid base. In that outline I think the interpretation will differ. I would focus on the process of quality control and aligning expectations. I think that’s what you want to determine and what project managers will stick to. The content within the PMP can stay a bit more flexible.

Do you have any suggestions for improvement?

Clarify the importance of this process schedule in a kind of introduction. Explain that the pre-award phase faces cost and time overruns and that following a certain process could prevent that from happening.

See the above. Next to that, you should really look at who’s doing what. I find the PMP a coproduction of the core team with limited input from supporting staff (specialists). This is currently displayed differently in the process schedule.