Risks allocated: problem solved?

A research into Risk Allocation in Dutch infrastructure projects

Master thesis
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Prologue

English… Dutch… English… Dutch…
Until the last minute before writing this prologue I doubted what language to use. The whole report is in English, so it would be strange to start in Dutch, but I just want to express my thanks to some people in this prologue, all being Dutch.
Doubt. It is not the best way to get forward, that’s what I learned. During this graduation I read the book ‘Life of Pi’ and it gave me a good kick in the ass with the following words:

To choose doubt as a philosophy of life is akin
to choosing immobility as a means of transportation

So…, let’s just move on.
As I said, I really want to thank some people for their contribution to my graduation thesis. First of all, I owe thanks to Twynstra Gudde (especially the people from Contracting and Risk Management), for their warm welcome and great help. But even more to Jeroen, my supervisor at Twynstra Gudde, for all the time and effort he put into my graduation thesis, for not caring about figures and all the more about words. I think he read every single word of this report a hundred times.
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I also owe thanks to all the 18 (!) interviewees for their available time to talk to me and for answering questions later on. Without them there would be no thesis at all.

Together with finishing this thesis, I finish my study in Delft too. I’d like to thank some other people for that.
Thanks to all my friends, fellow students and student organisations for making it seven very nice years. Let’s keep in touch.
Thanks to my parents who gave me the brains to do this and supported me in all kind of ways.
And thanks to Roel, just for who he is.

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Summary

The interest of parties to join a project, such as an infrastructure project, can be summarised in the value-price-costs model (Ridder, van der Klauw et al. 2002). The client is interested in a result that has more value than the price he pays and the contractor joins because he can make profit (= price - costs) with the project.

Project risks reduce the value, enlarge the costs or have effect on the price. This results in a less beneficial project for one or both parties. Project risk management can be used to reduce these risks. To be able to reduce risks, one has to know who is responsible to manage the risk and who bears the possible remaining consequences. This is called risk allocation. Currently there are no clear and practical rules as to how risks should be allocated and how the process of risk allocation should be designed to come to the best result.

In this research a distinction is made between effective allocation (i.e. the risk are allocated to the ‘right’ party) and efficient allocation (i.e. the time and effort of the process of risk allocation yield value for money).

The research is split in three parts. First the theory is investigated by literature search (chapter 2) and expert interviews (chapter 3). Based on this information six propositions are formulated (chapter 4) that are tested in the next phase. The first phase also resulted in a list of relevant context variables (section 5.3) that is taken into account during the research.

The second phase is a case study in which the propositions are tested. For this case study four cases are used (chapter 6-9). These cases are all Dutch infrastructure projects. The results have been analysed using the propositions, which led to the conclusions about the propositions (section 10.2) and some other conclusions (section 10.3).

In the last and third phase these conclusions are translated into recommendations for risk allocation (chapter 11).
The research led to the following propositions and conclusions:

- **Proposition: Using a clear and strict division of responsibilities leads to a more efficient risk allocation**
  Clarity about the division of responsibilities leads to efficient risk allocation. In general, also a strict division of responsibilities leads to efficient risk allocation. But, in cases of very large risks, a more effective risk allocation can be derived by having both parties deal with the risk (less strict division).

- **Proposition: Using an optimal division of responsibilities (i.e. one that does not create more risks than necessary) leads to a more effective risk allocation**
  Risks, allocated differently than the corresponding responsibility, create problems and policy or budgetary considerations can have negative influence on the division of responsibilities. A well-thought initial division of responsibilities is not enough for a continuously evolving project; one should arrange recurring dialogues to discuss the current division and make reallocation possible. Finally, by delivering work that lacks quality, clients create more risk than necessary.

- **Proposition: A dialogue on the transition risks lead to a more effective risk allocation**
  A dialogue in the tender phase does not have the atmosphere for a bidder to discuss the project, the project’s risks and the bidder’s proposal fully with the client, not even in a one-on-one situation. If one would want to allocate risks two-sided, a change is needed in this atmosphere. A dialogue at the start of the project can help to reduce the risks that are discussed during that dialogue. Recurring dialogues during the project are necessary to be able to use opportunities to optimise the risk allocation by reallocation.

- **Proposition: Allocating risks based on the allocation criteria (expertise and ability to influence, bearing capacity to sustain, motivation to bear, competence to foresee and assess) leads to a more effective risk allocation**
  The literature proposes lists of criteria without one of them being the leading; this is useless and impractical. An approach in which the ‘influence-criterion’ is used to determine the allocation of responsibility and risks and that the other criteria are used for fine-tuning within that allocation would be a more practical and realistic way of working.

- **Proposition: Pricing risks is only useful for risks that both parties can equally assess, influence and bear**
  Pricing risks is a difficult method for risk allocation. Besides, there are several reasons – different risk preference, either or not in competition and difference in perception – that show why the pricing of a client and the pric-
ing of a contractor are incomparable and pricing risks should therefore not be used as a means to decide which party can better manage a risk.

- **Proposition: Coupling individual benefit to total benefit (to stimulate the reduction of the impact of risks) leads to a more effective risk allocation**

Coupling individual benefit to total benefit is an effective way to motivate a party to reduce risks that do not influence its own benefit. Incentives are hardly used to motivate the client himself. To be able to use the right incentive, one needs to know each other’s interests in the project.

The research also resulted in some other findings and additional conclusions which can be summarised as follows:

- **The client creates risks by providing information thoughtlessly**

  The responsibility of the framework (information and specifications) is not transferable and will always remain with the client. Making mistakes or neglecting this responsibility creates more risks.

- **Using reference design reduces the ‘risk-thinking’ of the bidders**

  Using a reference design in the tender phase results in more risks allocated to the client. When deciding about the risk allocation and the use of a reference design, the client should consider whether he is capable of producing a reference design that creates less risks (and thus potential costs) than this reference design delivers in terms of reduced transaction costs.

- **Time, money and scope increase the willingness to bear**

  Having enough means (time, money, scope) to manage risks is necessary to deal with uncertainties. The more means, the cases study shows, the more willing a market party is to bear risks.

- **Client and contractor have different perceptions**

  The case study shows that the perception clients and contractors have of risks, their roles, the contract, the solution space, etc. differs strongly.

- **The atmosphere during the tender is not one of trust**

  The case study shows no examples of two-sided risk allocation, but the current situation during tender phases turns out neither to be one in which the parties trust each other.

- **Large uncertainties do not fit in a fixed price**

  In cases of large uncertainty a fixed price transfers too large risks to the contractor, which is expensive for the client. A ‘cost plus’ approach can be a solution for this problem.

The relation between risk allocation and project objectives (10.3.7) and the influence of context variables (10.3.8) are also analysed and discussed with the conclusions.
All these conclusions resulted in recommendations for the client and the client’s organisation on how to allocate risks in a contractual relation.

The research shows that the basis of risk allocation is the division of responsibilities, how to use the allocation criteria found in literature (the ability to influence is the prevailing criterion) and where to build-in incentives. Besides, it shows that the provision of information has large influence on the effect of the risk allocation and can also create a lot of risks. And risk allocation is not finished when risks are allocated, but needs to get attention through the whole project. Finally, client and contractor have per definition different perceptions of the project, their role and the risks. This needs attention when dealing with risk allocation.

Altogether, risk allocation is more complex than just using the allocation criteria and the right incentives. It is not always considered to look for an optimal division for the project, more risks than necessary are created by ‘sloppy’ work, especially with providing information, and one does not always have enough attention for the different perceptions of the parties and the continuous change of a project. Nevertheless, the current practice can be improved by small adjustments. A well considered initial risk allocation, as a starting point, providing information with a reason and only after a quality check, and recurring discussions between client and contractor about these topics, could improve a lot.

In section 11.4 recommendations for further research are given.
De motivatie van partijen om aan een (infrastructureel) project deel te nemen, kan worden samengevat in het waarde-prijs-kosten model (Ridder, van der Klauw et al. 2002). De opdrachtgever is geïnteresseerd in een resultaat dat voor hem meer waarde heeft dan de prijs die hij betaalt en de aannemer doet mee omdat hij winst (= prijs - kosten) kan maken met het project.

Projectrisico’s hebben invloed op de waarde (verlagend), de kosten (verhogend) en de prijs. Het optreden van deze risico’s kan resulteren in een minder gunstig project voor één of beide partijen. Project-risicomanagement wordt gebruikt om deze risico’s te verkleinen. Om de risico’s te kunnen managen, moet men weten wie verantwoordelijk is om het risico te managen en wie de mogelijke gevolgen moet dragen. Dit noemt men risicocovering. Momenteel zijn er geen duidelijke en praktische regels over de wijze waarop risico’s het beste kunnen worden gealloceerd en hoe het risicocoveringproces zou moeten worden opgezet om tot het beste resultaat te komen.

In dit onderzoek wordt een onderscheid gemaakt tussen effectieve allocatie (dwz het risico worden toegewezen aan de ‘juiste’ partij) en efficiënte allocatie (dwz het risicocoveringproces kost minder tijd en moeite dan het oplevert).

Het onderzoek is opgesplitst in drie delen. Eerst is de theorie onderzocht door middel van literatuuronderzoek (hoofdstuk 2) en expert interviews (hoofdstuk 3). Op basis van deze informatie zijn zes propositions geformuleerd (hoofdstuk 4) die zijn getest in de volgende fase. De eerste fase heeft ook geleid tot een lijst met relevante contextvariabelen die zijn meegenomen in het onderzoek (paragraaf 5.3).

De tweede fase is een case study waarin de propositions zijn getest. Voor deze case study zijn vier cases, allen Nederlandse infrastructuurprojecten, gebruikt (hoofdstuk 6-9). De resultaten uit de cases zijn geanalyseerd met behulp van de propositions en hebben geleid tot conclusies over de propositions (10.2) en een aantal andere conclusies (10.3).

In de laatste, en derde, fase zijn deze conclusies vertaald in aanbevelingen voor risicocovering (hoofdstuk 11).
Het onderzoek heeft geleid tot de volgende proposities en conclusies:

- **Proppositie: Een duidelijke en strikte scheiding van verantwoordelijkheden leidt tot een efficiëntere risicoallocatie**

  Duidelijkheid over de verdeling van verantwoordelijkheden leidt tot een efficiënte risicoallocatie. Daarnaast geldt dat ook een strikte scheiding van verantwoordelijkheden leidt tot een efficiënte risicoallocatie. Maar, in gevallen van zeer grote risico’s, kan een minder strikte scheiding (waarin beide partijen te maken hebben met hetzelfde risico) leiden tot een effectievere verdeling.

- **Proppositie: Een optimale verdeling van verantwoordelijkheden (een die niet meer risico’s creëert dan nodig) leidt tot een effectievere risicoallocatie**

  Risico’s die anders zijn gealloceerd dan de ‘bijbehorende’ verantwoordelijkheden, leiden tot problemen. Daarnaast kunnen beleid en budgettaire overwegingen negatieve invloed hebben op de verdeling van de verantwoordelijkheden.

  Een goeddoordachte initiële verdeling van de verantwoordelijkheden is niet voldoende voor continu ontwikkelende projecten: gesprekken op regelmatige basis zouden de mogelijkheid moeten geven om de bestaande verdeling te bespreken en onderdelen te ‘heralloceren’.

  Tot slot creëren opdrachtgevers door het leveren van kwalitatief slecht werk, meer risico’s dan nodig is.

- **Proppositie: Een dialoog over de verdeling van risico’s leidt tot een effectievere risicoallocatie**

  Een dialoog in de aanbestedingsfase heeft niet de sfeer waarin inschrijvers graag het project, de projectrisico’s en het voorstel van de inschrijver volledig met de opdrachtgever willen bespreken, zelfs niet in een één-op-één situatie.

  Een gesprek aan het begin van het project kan helpen om risico’s te reduceren. Met regelmaat terugkerende dialoegen tijdens het project zijn nodig om de risicoallocatie te optimaliseren, omdat bij de start van het project men niet over alle informatie beschikt om tot een optimale risicoverdeling te komen.

- **Proppositie: Allocatie van risico’s op basis van allocatiecriteria (kennis en kunde om risico te beïnvloeden, voldoende draagkracht, motivatie om te dragen en te managen, in staat om te voorzien en in te schatten) leidt tot een effectievere risicoallocatie**

  De literatuur stelt een lijst met criteria voor waarbij geen van de criteria leidend is; dit is nutteloos en onpraktisch. Een aanpak waarbij het ‘invloedcriterium’ wordt gebruikt om de verdeling van de verantwoordelijkheden en risico’s te bepalen en waarbij de andere criteria worden gebruikt voor ‘fine-tuning’ binnen deze verdeling zou een praktischere en realistischere manier
van werken zijn.

- Propositië: Het beprijzen van risico’s is alleen nuttig voor risico’s, die beide partijen gelijk kunnen beoordelen, beïnvloeden en dragen
Het beprijzen van risico’s blijkt een ingewikkelde aanpak voor risicoallocatie. Daarnaast zijn er verschillende redenen – verschil in risicobereidheid, al dan niet in concurrentie zijn en verschil in perceptie – die laten zien waarom de beprijzing van een opdrachtgever en die van een opdrachtnemer niet te vergelijken zijn. Het moet daarom niet worden gebruikt als een middel om te beslissen welke partij het beste een risico kan beheersen.

- Propositië: Het koppelen van het individuele belang aan het totale belang (om de beheersing van risico’s te stimuleren) leidt tot een effectievere risicoallocatie
Het koppelen van het individuele belang aan het totale belang is een effectieve manier om een partij te motiveren zich in te zetten voor een risico dat geen invloed heeft op zijn eigen belang. Contractuele prikkels worden ove-rigens nauwelijks gebruikt om de opdrachtgever zelf te motiveren. Het is wel belangrijk dat met elkaars belang in het project kent, om de juiste stimulans te kunnen gebruiken.

Het onderzoek resulteerde ook in enkele andere bevindingen en aanvullende conclusies; als volgt samengevat:

- De opdrachtgever creëert risico’s door slordig informatie te verstrekken
De verantwoordelijkheid voor informatie en specificaties ligt bij de opdrachtgever en is niet overdraagbaar. Het maken van fouten hierin en het verwaarlozing van deze verantwoordelijkheid creëert extra risico’s.

- Het gebruik van een referentieontwerp beperkt het ‘risico-denken’ van inschrijvers
Het gebruik van een referentieontwerp in de aanbesteding resulteert in meer risico’s voor de opdrachtgever. Wanneer men besluit over de risicoallocatie en het gebruik van een referentieontwerp, zou een opdrachtgever zich moeten afvragen of hij in staat om een referentieontwerp te maken dat minder risico’s (en dus potentiële kosten) creëert dan dat het referentieontwerp oplevert aan beperking van transactiekosten.

- Tijd, geld en oplossingsruimte creëren bereidheid om risico’s te dragen
Voldoende middelen (tijd, geld, oplossingsruimte) zijn nodig om risico’s te kunnen beheersen. Hoe meer middelen, laat de case study zien, des te meer bereid een marktpartij is om risico’s te dragen.

- Opdrachtgever en opdrachtnemer hebben verschillende percepties
De case study toont aan dat de perceptie van opdrachtgevers en opdrachtnemers van risico’s, hun rol in het project, het contract, de oplossingsruimte,
enz. sterk verschilt.

- De sfeer tijdens een aanbesteding is niet één van vertrouwen
  De case study toont geen voorbeelden van tweezijdig risicoallocatie, maar de huidige sfeer tijdens de aanbesteding blijkt ook niet één van onderling vertrouwen te zijn.

- Grote onzekerheden passen niet in een vaste prijs
  In geval van grote onzekerheid zorgt een vaste prijs voor zeer grote risico’s bij de opdrachtnemer. Deze zal een zeer hoge prijs vragen aan de opdrachtgever. Een ‘cost plus’-benadering kan een oplossing voor dit probleem zijn.

De relatie tussen risicoallocatie en projectdoelstelling (10.3.7) en de invloed van contextvariabelen (10.3.8) is ook geanalyseerd en besproken bij de conclusies. Al deze conclusies hebben geleid tot aanbevelingen voor de opdrachtgever en de opdrachtgevers organisatie over hoe om te gaan met risicoallocatie.

Het onderzoek laat zien dat de basis van risicoallocatie de verdeling van verantwoordelijkheden is, hoe de allocatiecriteria uit de literatuur gebruikt kunnen worden (met het kunnen beïnvloeden van een risico als bepalend criterium) en waar contractuele prikkels ingebouwd moeten worden. Bovendien blijkt dat de verstrekking van informatie grote invloed heeft op het effect van de risicoallocatie en extra risico’s kan creëren, en dat risicoallocatie niet klaar is zodra de risico’s zijn verdeeld, maar aandacht moet krijgen gedurende het hele project. Ten slotte, opdrachtgever en opdrachtnemer hebben per definitie verschillende percepties van het project, hun rol en de risico’s. Dit heeft aandacht nodig wanneer men bezig is met risicoallocatie.

Al met al, risicoallocatie is complexer dan alleen maar het juiste gebruik van de allocatiecriteria en het inbouwen van de juiste prikkels. Er wordt nog niet altijd een overweging gemaakt voor een optimale verdeling, door slordig werk worden er meer risico’s gecreëerd dan nodig, met name door de informatievoorziening, en er is niet altijd voldoende aandacht voor de verschillende percepties van de partijen en de continue verandering van een project. De huidige praktijk echter worden verbeterd door kleine aanpassingen. Een goed overwogen initiële risicoallocatie als uitgangspunt, het verstrekken van informatie met een reden en alleen na een kwaliteitscontrole, en steeds terugkerende discussies tussen opdrachtgever en opdrachtnemer over deze onderwerpen, zouden veel kunnen verbeteren.

Paragraaf 11.4 geeft aanbevelingen voor verder onderzoek, naar aanleiding van dit onderzoek.
Table of contents

Prologue
Summary
Samenvatting

1 Introduction 1
1.1 Introduction to the subject 1
1.2 Introduction to the problem 5
1.3 Problem definition 9
1.4 Research objective 9
1.5 Research questions 10
1.6 Definitions and delineation 10
1.7 Report overview 11

Phase 1

2 Literature search 13
2.1 Known versus unknown 13
2.2 Allocation of identified risks 14
2.3 Allocation of unidentified risks 18
2.4 Effectiveness 19
2.5 Efficiency 20
2.6 Criticism on the standard risk allocation approach 20
2.7 Summary: requisites and context variables 30

3 Expert interviews 33
3.1 Expert interviews 33
3.2 Summary: requisites and context variables 46

4 Propositions 49
4.1 Goal of risk allocation 49
4.2 Propositions 50
4.3 Total process 56

Phase 2

5 Case study protocol 57
5.1 Case study theory 57
5.2 Propositions 57
5.3 Selection of cases 58
5.4 Data collection 60
5.5 Quality 62
6 Case A: Spoedanpak Amsterdam – ’t Gooi 65
6.1 Introduction 65
6.2 General information project 66
6.3 Analysis 68

7 Case B: A2 Hooggelegen 71
7.1 Introduction 71
7.2 General information project 71
7.3 Analysis 74

8 Case C: Dredging Amsterdam-Rijnkanaal 79
8.1 Introduction 79
8.2 General information project 79
8.3 Analysis 81

9 Case D: Maasvlakte 2 85
9.1 Introduction 85
9.2 General information project 85
9.3 Analysis 87

10 Analysis and conclusions 91
10.1 Introduction 91
10.2 Analysis and conclusions about propositions 91
10.3 Additional observations about risk allocation 97
10.4 Overview 104

Phase 3

11 Recommendations 107
11.1 Introduction 107
11.2 Recommendations for risk allocation 107
11.3 Risks allocated: problem solved? 110
11.4 Further research 111

12 Epilogue 113

13 Bibliography 115

Appendix

A. Approach expert interviews 119
B. Interview protocol 121
C. Transcript case interviews 123
D. Analysis scheme 175
E. Proposed allocation process 181
1 Introduction

1.1 Introduction to the subject

Creating structures – like roads, bridges, buildings – in the construction industry is an economic activity which means both clients and suppliers need to benefit from it (Ridder, van der Klauw et al. 2002). It is only useful to build new structures when value is created for the client – often governmental organisations – and profit is generated for the supplier – a contractor –. Therefore, enough total benefit needs to be created (see figure 1). When this is combined with a reasonable price, both client (or consumer) and supplier will benefit from the project. This benefit for both parties is the reason for a (single) transaction in the construction industry. The larger these benefits are, the more successful the project is.

![Value-price-costs model](image)

Figure 1. Value-price-costs model (Ridder, van der Klauw et al. 2002)

Unfortunately, nothing is for sure in construction projects. “All capital works projects whether in public or private sectors, mega project or modest project, involve inherent risks in the form of political or economic change, climate, technology, ground conditions, engineering uncertainties, errors, industrial disputes, land issues, environmental issues and many more.” (Cartlidge 2004)

These risks can affect the value, price and costs of the project and therefore can threaten its total benefit.

1.1.1 Risk

What is risk? This is a difficult question. A large debate is going on about the exact scope and the different meanings of the word risk. “Everyone agrees that risk arises from uncertainty, and that risk is about the impact that uncertain events or circumstances could have on the achievement of goals.”(Hillson and Simon 2007) One could say risk consists out of (1) an event, with (2) a probability of occurrence and (3) a consequence.
Risk arises out of individual or organisational decision making. At its widest, this might include whole societies. A nation, for example, through democratic processes, might decide to adopt nuclear power generation for its main source of electrical energy and thus accept the technical risk involved.” (Akintoye, Beck et al. 2003)

Three levels of risk can be distinguished: organisational (which can be divided into strategic, tactic and operational level), programs and projects (TwyistraGudde 2009). The latter, risks in projects, is the subject of this research. These are risks that arise from the decision to start a project. From here on, where risk is used, project risk is meant.

Some sources, like the PMBOK Guide (PMI 2000), define risks as a combination of threats and opportunities, while others take only the negative side into account (Well-Stam, Lindenaar et al. 2003).

This thesis investigates infrastructure projects. In the practice of infrastructure projects often only the negative side of risks is taken into account.

Therefore, for this research the definition of risk will be:

*an uncertain event or set of circumstances that, should it occur, will have a negative effect on the achievement of the project objectives.*

One can subdivide risks in several ‘guises’¹:

- **Known knowns:** the things we know we know. These are no risks, but mentioned for the sake of completeness. These are project or context specifications.

- **Known unknowns:** the things we know we don’t know. These are the identified risks. In the course of a project, the organisation has identified these risks and either they are or are not taken into account.

- **Unknown knowns:** the things we don’t know we know. These are the things one should have known. They are not taken into account, while at least one party should have thought of them.

- **Unknown unknowns:** the things we don’t know we don’t know. This is uncertainty in its purest form. Nothing is known about these risks. These are often (but not always!) risks with low probability high impact, also known as ‘black swans’.

The effect of the risks on the value, price and costs of a project is shown in figure 2. According De Ridder, Van der Klauw and Vrijhoef (2002) demand specification risks (and costs) affect the value, production risks (and bid costs) affect the costs and transaction risk (and costs) affect the price.

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¹ Terms introduced by United States Secretary of Defense Donald H. Rumsfeld (February 12, 2002)

Figure 2. Value-price-costs model including risks (Ridder, van der Klauw et al. 2002)

One could add that this is only the case when a fixed price is arranged. In case of a flexible price – for example a price based on quantities – the production risks will also affect the price.

To create a successful project one has to maximise the total benefit. Apart from that, each party (the client and the supplier) wants to maximise its own benefit or respectively profit. Maximising benefit and profit can be done by minimising – managing – these risks.

1.1.2 Risk management

There are different theories on risk management. Some are very extensive and some quite brief. But in the end it all comes down to an iterative process of recognising risks, analysing risks (both steps part of a risk analysis), taking action and finally, monitor and evaluate this, before – as a kind of circle – starting all over. The different theories slightly differ in the way they define the different steps in this circle, but generally the following steps can be used: Identify-Analyse-Respond-Monitor. This section will briefly introduce these steps.

Identify

This process results in a risk register which contains a long list of risks. These are in fact the known unknowns mentioned before. To come to this list, experience and brainstorming sessions are generally the most important sources.

The RISMAN-method, which is often used in the Dutch infrastructure, uses a risk matrix to support this process (Well-Stam, Lindenaar et al. 2003). On the vertical axis the project process is summed up and on the horizontal axis different points of view (such as technical, organisational, political, etc.) to make sure all aspects of the project are discussed.
Analyse
In this step risks will be prioritised: the analysis focuses on determining how large the risks are. This can be done in many different ways. One can do this either qualitatively or quantitatively, with complex software or by hand. A probability-impact-matrix is often used to visualise the prioritised risks.

Respond
Depending on the severity of the risk one has to decide how to respond. Several responses are possible:
- Avoid: change the scope of the project so, that the risk will be eliminated.
- Transfer: transfer to another party that can better deal with the risk. This can be one of the project parties or for example an insurance company.
- Reduce: take mitigation measures which reduce the probability of occurrence and/or the impact of the event.
- Accept: in case the risk is not worth taking any action.

Monitor
More information comes available in this phase; probability and impact can be evaluated and lessons can be learned. “As a project progresses, the nature and extent of risks may change, new risks may emerge and existing risks may change in importance…” (Rahman and Kumaraswamy 2002) Therefore it is important that risks are monitored.
Winch (2002) states that monitoring the risks requires a risk owner, appointed to do the monitoring. Ownership of risks is the major issue in risk allocation. In a project it is important that one knows which party is the risk owner. One could add to this statement that more than one risk owner is also possible.

1.1.3 Risk allocation
To react to risks (the respond step) and to effectively monitor them – and thus to effectively manage risks – one has to know who is responsible for taking the response actions and do the monitoring and who bears the consequences when the risk event occurs. Often this is the same party, because that is the party motivated to reduce the risk (because of the potential consequences it should bear), but it is also possible that the other party is asked to reduce the risk. In that case, another way to motivate the party to reduce the risk is required. The placement of each of the risks at one or both (of the) parties is called risk allocation.
If this is done appropriately, it increases the effectiveness of the risk management and decreases the disputes on responsibility when risks occur.
When risk is optimally allocated, the total impact of the risks on the project objectives will be minimised. This means less money, time or quality is lost due to occurring risks. In the end this leads to a higher added value for the client and more profit for the supplier (or contractor). This is shown in figure 3.
Risk allocation is the object of this research and will be discussed more extensively in the next section.

Figure 3. Value-price-costs model with reduced risks

1.2 Introduction to the problem

As explained in the introduction to the subject, a good risk allocation can reduce the impact of risks on the project result. According to the value-price-costs model this reduction is beneficial for both parties. Simply allocating the risks in the right way and cashing the benefits seems a good idea then. Unfortunately it is not that easy. It is not crystal clear what a good risk allocation is and this can strongly vary per project and depends on whose viewpoint you take. These first two aspects – good risk allocation and difference in projects – are introduced in the next two sections. Afterwards some risk allocation processes are introduced and definitions of the most important terms are set.

1.2.1 ‘Good’ risk allocation

This section explores what good risk allocation implies. In literature it is often stated that risks should be placed with the party that is best able to manage it (Li, Akintoye et al. 2005; Ashley, Diekmann et al. 2006; Hoof and Snik 2008). This is a vague and broad statement which can be interpreted in different ways.

Fisk and Reynolds (2006) state that “the principal guideline in determining whether a risk should be so transferred is whether the receiving party has both the competence to assess the risk fairly and the expertise necessary to control or minimise it. An additional guideline is the determination of whether the shift of the risk from the owner to another party will result in a savings to the owner and the public.”

Lam, Wang et al. (2007) conclude that there are seven risk allocation criteria that influence the final risk allocation:

- Whether the party is able to foresee the risk.
- Whether the party is able to assess the possible magnitude of consequences of the risk.
- Whether the party is able to control the risk chance of occurring.
- Whether the party is able to manage the risk in case of occurring.
- Whether the party is able to sustain the consequences if the risk occurs.
- Whether the party will benefit from bearing the risk.
- Whether the premium charged by the risk receiving party is considered reasonable and acceptable for the owner.

In the Dutch guide on risks and contracting (CROW 2008) seven (partly different) criteria are summed:
- Whether the party can influence the risk.
- Whether the party has the insight in the risk and its mitigations.
- Whether the party is motivated to bear the risk.
- Whether the party has the capacity to bear the risk.
- Whether the party will be limited in the implementation of the mitigations.
- Whether the party has intrinsic social responsibility to bear specific risks.
- Whether the phase of the project, in which the risk is important, fits the phase in which the party can be active.

As shown above, looking at only three sources already gives a lot of different criteria for the allocation of a risk. They overlap for a great part, but still approach it in a different way. Besides, these are clear and logical lists, but it is hard to use them in practice. For example, it can be that a party is very well able to influence a risk, but is absolutely not motivated to bear the risk.

To know how a process of risk allocation should look like, one has to know how risks should be allocated. This is one of the parts of this research.

‘Good’ risk allocation is a very subjective statement. Is that the allocation that is most beneficial for the client? Or the most profitable for the contractor? Or which reduces the most risks? Or which is the cheapest? This is hard to define. Based on the value-price-cost model the following principle is used for this research: a good risk allocation is an allocation that in the first place leads to a higher total benefit (value - costs) and in the second place results in an even distribution of profit/benefit for the parties (which is a reasonable price).

1.2.2 Difference in projects

The allocation of risks is not by definition the same for each project. Each project is different: it has a different risk profile, a different type of contract and different actors. Besides, these actors have, as stated above, different capabilities to manage the risks. The influence of these differences – risk profile, type of contract and actors – are discussed below.
Different risk profiles
Projects differ on their risk profile: what types of risks are relevant, what are the largest risks and what is the total amount of risks?

Six different categories of risks are distinguished in the construction industry by the American Society of Civil Engineers (1979):
- Construction-related risks
- Physical risks (subsurface conditions)
- Contractual and legal risks
- Performance risks
- Economic risks
- Political and public risks

Each project has a different combination of these risks. One project has mainly political risks, while the core of another is in for example construction-related risks. This means that for each project the risk management, and so the risk allocation, will be filled in differently.

Different types of contract
Additionally a major difference between projects can be the type of contract. The type of contract has a large influence on the allocation of risks, because it places responsibilities in different ways with actors. One can easily turn this around: a desirable allocation of risks can also have great influence on the type of contract.

There are two aspects in a contract on which the largest differences can occur, that have influence on the risk allocation:
- the reimbursement system and
- the degree of integration of activities.

When choosing the right reimbursement system for a certain project one in fact is looking for the right incentive. “The aim is simply to provide an adequate incentive for efficient performance by the contractor which is matched by an incentive for the client to provide the necessary information and support to the contractor in a timely manner.” (Burtonshaw-Gunn 2009)

For the reimbursement system there is a scale from Cost Plus Contract – which is based on declaring each expense – and Fixed Firm Price Contract – which is based on one price for the whole package of work – with several options in between (Burtonshaw-Gunn 2009). Figure 4 shows that the choice of this contract (its position on this scale) influences the risk allocation: cost plus contracts have per definition more customer risks and fixed price contracts more supplier risks.
The other aspect is the degree of integration in the contract. This determines the amount of work transferred to the contractor. It makes quite a difference whether a contractor only has to build a structure that is already designed or he has to arrange the whole process of designing, constructing, maintaining and financing.

These aspects of a contract have large influence on the risk allocation and should therefore be taken into account on the moment the choice of contract is made.

**Different actors**

Each project has different actors and each actor can differ in its risk preference: it can be risk-neutral, risk-averse or risk-seeking. Winch (2002) state that this preference is determined by a large amount of factors, of which the most important are: the proportion of total assets at stake, the opportunities for the laws of chance to work, sentiment, organisational culture, managerial capabilities and the human condition. He also claims that in construction projects clients are typically very risk averse.

According to Akintoye, Beck et al. (2003) risk is a social construct, any risk must be perceived by human beings. These perceptions are influenced by value systems, attitudes, judgements, emotions and beliefs. It has a different meaning to different people or even a different meaning to the same person, at different moments in its life.

To be able to allocate risks in the right way, one has to know how these differences (on risk profile, type of contract and actors) influence the allocation process. This will be taken into account when researching risk allocation.

**1.2.3 Types of allocation processes**

The process of risk allocation can be organised in many ways. How this is organised depends on many factors. Generally the client always starts with an initial risk allocation. This is based on the first risk analysis and on the insight of the client. Depending on how the process is organised this allocation can be adjusted until the closing of the contract. A general classification can be made based on how these allocation processes are organised: one-sided allocation by
the client and no reallocation, one-sided allocation by the client with realloca-

tion or a two-sided allocation process.

1. One-sided allocation by the client and no reallocation
In this case the initial distribution of the client cannot be changed in the
tender process. This means the risk allocation is fully based on the wishes
and the knowledge of the client.

2. One-sided allocation by the client with reallocation
During the tender procedure the bidders are able to propose risk realloca-
tions. This goes together with an adjustment of the bid. The client (or con-
tractor) then can decide whether he thinks the offer is interesting enough to
shift the risk.

3. Two-sided allocation process
In some procedures, like the competitive dialogue, the process is slightly
different. The client allocates the evident risks – the ones of which is clear
whether they belong to the client or the contractor – and leaves the ‘grey-
area risks’ (CROW 2008) to be allocated during the competitive dialogue.
In the Netherlands Rijkswaterstaat has introduced the system of ‘listed risks’
(Dutch: Lijstrisico’s) that is based on this principle.

1.3 Problem definition
Currently, it is unclear how a good risk distribution looks like and how the
process of risk allocation can be best organised to come to the most optimal
risk distribution.
The effect of this problem is that in projects risks will be allocated to the wrong
party, i.e. not the party that is able to reduce the risks the most. This will result
in more negative impact of the risks on the achievement of the project objec-
tives, which will lead to less total benefit for the project – which makes
projects less attractive to realise – or less individual benefit for the involved
parties – which makes it less attractive to realise projects –.

1.4 Research objective
To describe the relation between the risk allocation process, the result of a
project and the important context variables by comparing theory and practice.
The conclusions will be submitted in a proposal for improvement towards
effective and efficient risk allocation by using the information on this relation.
1.5 Research questions

1. What are requisites for an effective and efficient risk allocation according to literature and experts?
   1.1. What is an effective and efficient risk allocation?
   1.2. What are according to literature and experts requisites for an effective allocation of an identified risk?
   1.3. What are according to literature and experts requisites for an effective allocation of unidentified risks?
   1.4. What are according to literature and experts requisites for an efficient risk allocation process?

2. What context variables influence the process and the result of risk allocation according to literature and experts?

3. What do cases show about these requisites (translated into propositions based on the requisites for effective and efficient risk allocation, dealing with the allocation process and the result of the project) and important context variables?
   3.1. How are the process of risk allocation and the result of the cases?
   3.2. How is this risk allocation (answer question 3.1) compared to propositions?
   3.3. What can be concluded about the propositions?

4. What other mechanisms do the cases show relevant for risk allocation?

5. How can the information about the propositions and other mechanisms (answer question 3 and 4) be used to do a proposal for improvement of effective and efficient risk allocation?

1.6 Definitions and delineation

*Risks* are project risks.
Risk is defined as an uncertain event or set of circumstances that, should it occur, will have a negative effect on the achievement of the project objectives.

*Risk allocation* is deciding who bears the possible consequences of a risk and who is responsible for the response and the monitoring of the risk as well as the total distribution of the risks.
In this research only risk allocation between client and contractor is taken into account.
The risk allocation *process* is everything that influences the risk allocation from the initial allocation of the client until the allocation that is included in the contract.

With *effective* risk allocation is meant whether a risk is allocated with the right party and with an *efficient* risk allocation is meant a process in which time and resource inputs during the negotiation process yield value for money.
The ‘right party’ depends very much on the project. This differs for example with project objectives (a risk allocation in a project with high time pressure is different from a project with high quality requirements) and should always be seen in the perspective of the project.

With the right risk allocation is meant an allocation that leads to the largest total benefit (value - costs) in the first place and to the best division of benefits in the second place (a reasonable price).

1.7 Report overview

The research is divided into three parts, each answering one or two research question(s).

Phase 1

Questions:
- What are requisites for an effective and efficient risk allocation according to literature and experts?
- What context variables influence the process and the result of risk allocation according to literature and experts?

These questions will be answered by literature search and expert interviews. For the literature Dutch sources as well as international literature will be used. The expert interviews will be done by interviewing people that have experience with the risk allocation process in the Dutch construction industry. These should be as well from the client side, the contractor side and the adviser side of the construction industry.

This phase will be concluded with the formulation of propositions (based on the requisites for effective and efficient risk allocation) that will be used in the following phases.

Phase 2

Questions:
- What do cases show about these requisites (translated into propositions based on the requisites for effective and efficient risk allocation, dealing with the allocation process and the result of the project) and important context variables?
- What other mechanisms do the cases show relevant for risk allocation?

These questions will be answered with a multiple case study. To be able to do a extensive research, it is necessary to first make a well-founded selection of projects. In this selection the context variables (result of phase 1) will be taken into account.

To get useful results from these cases it can be helpful to choose projects that are tendered not too long ago, because in that case one can remember more details.
For each project the key players on the risk allocation will be interviewed and important documents will be investigated.

The result should be an insight on whether the relation, described by the propositions, is right and what the influence of the context variables is. It should also give insight to other mechanisms that are relevant for risk allocation.

**Phase 3**

**Question:**
- How can the information about the propositions and other mechanisms (answer question 3 and 4) be used to do a proposal for improvement of effective and efficient risk allocation?

The evaluation of the cases, together with all other results of the research, can be used to finally do a proposal for improvement of risk allocation.
Phase 1
2 Literature search

This chapter will give the reader an overview of what is written on this topic in the literature, in addition to what is described in chapter 1. This overview is focussed on answering parts of the first two research questions as stated in section 1.5. At the end of this chapter some conclusions will be drawn to answer the questions.

In the introduction the following definition is given of right risk allocation:

Right risk allocation is an allocation that leads to the largest total benefit (value - costs) in the first place and to the best distribution of benefits in the second place (a reasonable price).

To come to an allocation that leads to the largest total benefit, one has to make sure that the total impact of the risks on the project objectives will be reduced. This means less money, time or quality is lost due to occurring risks. This can only be reached when allocation is done effective and efficient.

This is also defined in the introduction:

Effective risk allocation is about whether a risk is allocated to the right party. Efficient risk allocation is about whether time and resource inputs during the negotiation process yield value for money (see also 2.5).

Next to this a distinction is made in the research questions between identified and unidentified risks.

2.1 Known versus unknown

Identified and unidentified risks can be compared with respectively ‘known’ and ‘unknown’ things as introduced in 1.1.1. “Generally, risks that are either undefined or unrecognized prior to the contract award are the ones that subsequently cause the most grief.” (Kuesel 1979)

Therefore, Kuesel concludes, the following actions are needed:
1. Recognize and identify the risks (most important task of risk allocation)
2. Eliminate as many as possible of the unnecessary risks through proper organisation and preconstruction planning
3. Allocate the remaining risks logically

Ad 1. To be able to recognise and identify most of the important risks a good preparation is necessary. One has to invest time in this process. Besides that, prior to the contract award often only the knowledge of the client is used. The knowledge of the supplier(s) can be used here to enlarge the capabilities to identify the risks.
“The parties must be able to sit down together, prior to the start of the work, to come to a better understanding of the realities of the risk responsibility, assumption, and allocation.” (Fisk and Reynolds 2006)

The fact that there is increasing attention for public-private partnership projects is an advantage for this aspect. The involvement of the private parties with the public party creates all kinds of possibilities to communicate about risk allocation (Hoof and Snik 2008).

Involving suppliers in the process of identifying risks can help to avoid the following problem sketched by Thompson and Perry (1992): “unless a client recognises a risk the other parties to a project will tend to give attention to it only as far as they think wise to protect their own interest.”

Ad 2. This is the ‘avoid’-option in the Respond-step of risk management, which is introduced in chapter 1. The PMBOK-Guide (PMI 2000) states that “some risk events that arise early in the project can be dealt with by clarifying requirements, obtaining information, improving communication, or acquiring expertise.” Because these are risks which are directly eliminated (if these steps are taken) they do not need to be allocated in the contract.

Ad 3. Remaining risks imply all risks that remain after implementing the right planning and organisation. The identified risks (the known unknowns) are discussed in 2.2 and the unidentified risks (the unknown knowns and the unknown unknowns) in 2.3.

Note: the known knowns are solved through project specifications and as such not labelled as risk

2.2 Allocation of identified risks

An overview of some general criteria for allocation of risks is given in the introduction (1.2.1). Such criteria can only be used for identified risks. One cannot say who for example can best influence a risk if one doesn’t know the risk. Therefore, unidentified risks need another approach which is discussed later in this chapter.

As stated in the previous section, with identified is meant identified prior to the contract closure.

Although the three publications cited in the introduction – and other comparable lists of criteria – give different criteria for allocation, they can be generally summarised into one list:

- Whether a party has the competence to foresee and assess (the size of the probability and the consequence of) the risk.
- Whether the party has the expertise and the ability to influence the cause or the consequences of a risk.
- Whether a party has enough bearing capacity to sustain the cause or the consequences of a risk.
- Whether a party is or can be motivated – for example by a reasonable premium or a social responsibility – to bear the risk.
These criteria will be discussed in the following part.

2.2.1 Allocation criterion: competence to foresee and assess

Client and supplier have different capabilities and knowledge. These parties will be able to foresee and assess different risks. It is difficult to say whether a party is able to foresee and assess a certain risk. Once a risk is identified – which is discussed in this section – one could say it is in fact foreseen, and maybe even assessed, and it seems therefore of no difference which party can better foresee and assess that risk.

This is only the case though, when both parties have the same information at the start of the project. Clients are generally not able to judge the capabilities of the contractor (Janssen 2009). Janssen also found that often suppliers themselves are not able to judge the risks allocated to them. By working together on the identification both parties have and are able to share more knowledge about the risks.

Another thing is important here; generally in a tender procedure suppliers (bidders) are asked to make a price, often fixed, for the project. This means they have to estimate what the impact of the risks will be, in order to do a bid that is high enough to cover all the costs, but is low enough to win the tender. The better the estimation of the risks, the better the bid will be.

So, allocating a risk based on this criterion is difficult to do and is less difficult when done together. Nevertheless, the criterion is relevant when bidders are asked to price the work, including the risks allocated to them, because then they have to assess these risks.

2.2.2 Allocation criterion: expertise and ability to influence

This criterion seems obvious but is said often to be forgotten. Sometimes a great amount of risks is allocated at the contractor on which he has no influence. In other words, he is not able to reduce the cause or the consequence of the risk and can thus not control the risk. Iersel, Peters et al. (2005) found that in the Netherlands a movement is made towards allocating more risk at the contractor. Allocating risks at the contractor which he cannot influence results in increasing costs and less benefit for the project.

The word ‘influence’ is important here. If, for example, a contractor is asked to bear a risk that he cannot influence, he will probably ask a large risk premium in return. As Lam, Wang et al. (2007) say: “The cost of improper risk allocation could be seen from the response from contractors such as adding a high contingency (premium) to the bid price or delivering low quality work. During the project, the owner might have to spend more management resources for the increased work disputes.”

There is influence in different ways: influence on the cause and influence on the consequence. A contractor is able to influence the cause of the risk if he for example chooses for another working method to avoid subsidence.
In case of a risk that is caused by the weather, the contractor could say he is not able to influence the risk. But nobody can! Here should the influence on the consequences be taken into account. The contractor might be able to make an effective contingency plan or take mitigating measures to reduce the impact.

So, to reduce the impact of risks on a project – the goal of risk allocation – it is effective to allocate risks to the party that can influence the cause or the consequence of the risk.

2.2.3 Allocation criterion: bearing capacity to sustain

A distinction can be made between the qualitative allocation – i.e. what type of risk is allocated and to whom – and the quantitative allocation – i.e. how much of the risk is allocated – (Li, Akintoye et al. 2001). By keeping this in mind, it is possible to have a party bear a certain risk, but only to the amount that he is able to bear. One cannot have a contractor bear huge risks that, if they occur, are able to have him go bankrupt. Creating an upper bound for the risk, also known as ‘capping’, can be a useful tool in the allocation of risks. In this way, a party could bear all kind of risks to a certain amount, as long as the sum of the (capped) risks does not exceed the bearing limit. The client bears the remaining risk. In infrastructure the client is generally a governmental organisation, which means it can better bear such extreme risks.

The importance of this point, especially to avoid unnecessary high bids, is underlined in the Dutch report on PPP-projects (Wassenaer 2004).

2.2.4 Allocation criterion: motivation to bear

Rewarding parties that bear risks can be seen as an important factor in risk allocation, as is underlined by research of Ward, Chapman et al. (1991): “The quality of project risk management is improved if […] parties who are expected to bear risk receive adequate reward for doing so”. If parties can influence their own individual benefit by managing risks, they will be more motivated to do this in the right way. This will be explained in the following part.

In the introduction (chapter 1) the value-price-costs model is explained. What can be seen in this model is that the added value for the client is determined by the total value of the project and the price, while the profit for the supplier is determined by the costs and the price.

This means the success of the project and the success of the individual parties can be separated. The success of the project is only determined by the difference between costs and value. This can be reduced by risks that influence the value and the costs of the project.

From the success of the project, the success of the individual parties can be derived by including the final price of the project. This individual benefit – the added value or the profit – is the reason why the parties join the project.
Ashley, Diekmann et al. state that “the goal of an optimal allocation of risk is to minimize the total cost of risk on a project, not necessarily the costs to each party separately” (2006). This means that the goal of risk allocation is to minimize the risks that influence the value and the costs of a project.

Concluding, one can say that both parties strive for the largest individual benefit, because this is what they can win in the project. Next to that, risk allocation should in the first place be used to minimize the total cost of a project or to maximise the value. This can be integrated into the following: *When risk allocation is organised well, the drive to maximise individual benefit can be used to minimise the total cost of risk in a project.*

Of course, “it would be unrealistic to expect the designer, owner, or contractor to subordinate his own interests to any of the others...” (ASCE 1979) Therefore it is necessary to couple individual benefit to total benefit.

For example, the supplier is able to reduce certain risks of which some influence the costs and some the value of the project. He will be motivated to reduce the risks that influence the costs, because this will enlarge his individual benefit. He is not directly motivated to reduce the risks that influence the value, because this has no influence on his individual benefit. When he receives a premium to reduce the risk that influences the value, he will be motivated to reduce those risks because now the price is coupled to the value and thus his individual benefit again will be larger.

In the same way the client himself will be motivated to reduce risks that influence the value of the project and should be motivated by a price reduction to reduce risks that influence the costs or by the ‘threat’ of a rise of the price when such risks are badly managed. If the influence of the client on the costs is not coupled to the price, “clients may become careless of actions, such as changes in plans, with which a contractor must cope to an extent that would not occur if the client bore the cost.” (Ward, Chapman et al. 1991)

However, the client makes the contract and it is therefore strange to include a punishment for the client, but in fact this ‘threat’ already exists. When a contractor makes more costs because of the mismanagement of risks by the client, he will probably try to get those costs back, one way or the other. Because this is not included in the contract, the atmosphere in such cases is often one of disputes. As a client it is important to realise this effect.

It is also possible that a party is motivated by something else than an adaptation of the prices. For example, by the need to obtain work (Ward, Chapman et al. 1991), the enhancement of credibility, reputation and efficiency in planning and innovation (Lam, Wang et al. 2007) or social responsibility (Iersel, Peters et al. 2005).

It should be clear that two separate things are explained here: (1) when transferring a larger assignment towards the contractor and with that transferring
more risks, the price will rise as the contractor has to deal with more risks and (2) when using the result of the project (whether or not risks are well managed) to reward or punish the contractor one can stimulate him for good risk management.

**Equilibrium**
Between what is explained on the ‘bearing capacity’ and the ‘motivation to bear’ the equilibrium has to be found. This is the equilibrium between the incentive that a party has to manage a risk well and the motivation to bear that risk in the first place (risk premium). If a large part of the risk lies with a party, he has a large incentive to manage that risk, but he will also ask a high price for it and vice versa. The aspect of value for money is very important here.

### 2.3 Allocation of unidentified risks

With unidentified risks all the unknown things are meant. As well the unknown knowns (the things one should have known), as the unknown unknowns (the real uncertainty). Because these risks are in fact quite different, they are discussed separately.

#### 2.3.1 The things we should have known

This is about risks that are not identified prior to the contract closure. This can be caused by for example negligence, poor preparation, indifference, strategic reasons, etc. Not a lot is written on this subject. The better the preparation phase (identification of risks) the smaller the amount of ‘unknown knowns’. How these risks could be allocated needs to become clear in the expert interviews.

#### 2.3.2 Real uncertainty

These are the risks that none of the parties could have foreseen. Rahman and Kumaraswamy (2001) agree that “… not all the risks are foreseeable at the outset. […] Flexibility in construction contracts is therefore necessary.” They think unforeseen risks need to be dealt with, using Joint Risk Management strategy. This can be provided with Relational Contracting, such as alliancing, partnering, joint venturing, long-term contracting, etc.

In these forms the contracting parties ‘share the pain and the gain’. This can be done for the full contract or only parts of it.

So, it is possible to allocate the real uncertainty (particularly risks with small chance and high consequences) at both parties. This can be done by introducing a contingency fund: when one of the risks occurs, both parties pay for the consequences. At the end of the project the parties share what is left in the fund. In that way they share the pain and the gain.
2.4 Effectiveness

Besides the fact that identified (2.2) and unidentified (2.3) risks need to be allocated, there are more things that can lead to a more effective risk allocation. These are discussed here.

One could say that requisites for a reduction of disputes later in the process are also requisites for effective risk allocation. A few are discussed below.

“A decrease in the probability of a dispute between contracting parties requires that all parties have the same understanding of risk allocation.” (Hartman and Snelgrove 1996) Pointing who should bear what risk and putting that together in a contract is not enough for an effective risk allocation. “Contract language alone is insufficient to clearly specify risk appointment between the contracting parties.” (Rahman and Kumaraswamy 2001) Parties can interpret a contract differently, which can create conflicts when a risk occurs. Therefore, common understanding (‘meeting of the minds’) of the contract – and so the risk allocation – is necessary and can only be realised with open and honest communication between the contracting parties prior to contract execution (Hartman, Snelgrove et al. 1997).

The need for open and honest communication is confirmed by Ward, Chapman et al. (1991): “Successful, appropriate allocation of risk presupposes an atmosphere of trust between contracting parties, and a clear, mutual appreciation of all relevant project risks and their effects. Subsequent risk analysis by other parties […] is appropriate, and the sharing of information about risks between parties highly desirable.”

One can question here whether this is fully realistic. Although there has been a moment of common understanding before contract closure, still a party can later in the project act as if it interprets the contract differently, because that leads to a better result for that party. The conflicting interests of the parties and strategic behaviour are very important to take into account here. These are discussed in section 2.6.3.

Janssen (2009) searched for causes of allocation discussions in the Dutch construction sector. He states that these discussions are the proof of ineffective allocation of risks. Again the strategic behaviour of parties is forgotten here. Nevertheless, action to reduce allocation discussions can help for effective allocation.

His recommendations to improve the allocation (in such way that discussions are reduced) are: identify risks explicitly and make an initial allocation; make sure the risks and the initial allocation are discussable; have bidders price the risks in competition.
2.5 Efficiency

As explained earlier in the report, proactively managing risks – by addressing and allocating them correctly – should result in lower costs of risk occurring. But, “even high levels of investment in control processes will not eliminate all risk…” (Burtonshaw-Gunn 2009). This means that there is an optimum for investment in risk control, see figure 5. This figure shows the costs for the total of all risk management, but the same can be done for the process of risk allocation. That optimum is meant with ‘efficient risk allocation’.

![Figure 5. Balancing risk and control (Burtonshaw-Gunn 2009)](image)

In terms of efficiency one could think of ‘just’ using standard terms of contract, which provides a risk allocation for the project. But, “the availability of ‘model’ (or ‘standard’) sets of general conditions of contract has held back clear thinking about risk allocation. Risk is allocated in these models, but the principles behind the allocations have not been stated.” (Thompson and Perry 1992)

CROW (2008) advises to limit the risks explicitly allocated in the contract to the 20% biggest risks. This is based on the assumption that the 20% biggest risks affect 80% of the risk budget. One has to take in mind the other risks, but they do not need to be allocated explicitly in the contract. These could also be allocated all together at one or both parties. This point conflicts with the will to reduce the unknown knowns (2.3.1).

2.6 Criticism on the standard risk allocation approach

In the first part of this chapter the general theory on risk allocation and some aspects of risk management are described. It shows how one should organise the risk allocation process and how one should allocate risks to come to the best result. But is there such a thing as one single truth? No. There are some
people that disagree with this sketched theory and that have certain critique on risk management in general and sometimes risk allocation specifically.

The following will be discussed in this section:
- Starting risk allocation with the division of responsibilities: the literature states one should start with identifying risks, while it seems more efficient to start with the division of responsibilities.
- The weaknesses of risk management: one should not ‘just’ use risk management, but should also realise what the risk of using risk management is.
- The effect of strategic behaviour: in risk allocation one deals with different interests which often lead to strategic behaviour. This is an aspect of the subject that needs to be taken into account.
- Dumping risks: it seems to become more usual to ‘pass the buck’ to the contractor. The question is whether this still leads to the best project result.

2.6.1 Clear division of responsibilities

The Living Building Concept (LBC) (Ridder 2006) is a theory on how the construction sector should operate. This view is inspired by the ‘regular consuming market’ where suppliers decide what they offer and clients choose the offer that matches their wishes.

According to the LBC risk allocation should be organised less complicated. De Ridder states that the supplier should be responsible for all risks with regard to the object and the client should be responsible for risks with regard to the interaction between the object and the context. This is shown in figure 6.

![Figure 6. Risk allocation according to Living Building Concept (Ridder 2006)](image)
This should result in a clear division of responsibilities and risks, but should also reduce the effort on risk allocation which results in a more efficient approach.

Defining one clear division of responsibilities and risks makes it also possible to reduce all kinds of problems, because it costs less effort to discuss each individual risk – which was suggested by the general theory – and because there is less room for misunderstanding about what was agreed in the contract. Besides, risks always lie within the sphere of influence of the party, because risks and responsibility are allocated in the same way.

For example, you want a cross-river connection because there are a lot of people that want to cross the river and you hire a contractor to build it for you. A clear division of responsibilities would be the following:
- Contractor: responsible for a cross-river connection between road X and road Y, finished before date Z (satisfying all relevant norms).
- Client: responsible for the right information about the traffic

By stating this in such a way, you do not have to identify all risks relevant for realising a cross-river connection. It is clear to the contractor as well as to the client has to take all hurdles on its own way.

If you would describe all risks that are allocated to the contractor (things that deal with ground conditions, high water, weather, suppliers, etc.), you might forget something. And that could result in discussions and high costs or other consequences when the risk occurs.

One could say that when it is clear what the division of responsibilities is, the risks fall evidently within these responsibilities (as if the responsibilities are ‘catch-alls’). While when starting with identifying risks the question remains to whom unidentified risks are allocated. An abstract reflection of these two different approaches is given in figure 7.
One can see that using these ‘catch-alls’ the problem of unidentified risks is much smaller. When such risks occur it is much clearer whose responsibility it is.

Still, using a division based on ‘context vs. object’ and using the same division for each project seems too simple. As explained in 1.2.2, risk allocation differs between projects, because one has to deal with different risk profiles and different actors.

For example congestion caused by the construction or renovation of a motorway would be the risk of the client according to this proposed risk allocation since it is part of the context in relation to the object. When acting in this way, one misses the opportunity to motivate the contractor to deal with the traffic flow during his construction period. Or, in another case, when the client knows exactly what he wants, it is not in his advantage that the contractor is fully responsible for the object and with that responsible for the design.

It seems, that this sharp and clear division is a good thing, but that one has to consider the location of the ‘transition’ between client and contractor for each project separately. In this consideration the optimal division between client and contractor has to be found.

Using a clear division of responsibilities is to combine the effectiveness – by putting risks with the party that is responsible – and efficiency – by using catch-alls instead of extensive lists of risks – in one process. This approach fits with one of the recommendations of the ‘commission Ruding’ (Commissie Private Financiering Infrastructuur 2008), advising committee on the stimulation of privately financed infrastructure, which states that risk allocation should be improved by – assuming risk are borne by the party that can best manage it – laying it down early and sharply in the contract. And it fits the recommenda-
tions of ‘Kennis in het Groot’ (KinG 2009), asking for more clarity about risk allocation between client and contractor.

2.6.2 Comments on risk management

In his book ‘The failure of Risk Management’ Hubbard (2009) states that “a weak risk management approach is effectively the biggest risk in the organisation”. He shows several reasons to think there are people that apply weak risk management. How can this be important for risk allocation?

The theory prescribes that a good identification of risks is necessary to come to a good risk allocation. Besides, it is stated that one should focus on the 20% biggest risks. This means one should have a good view on what risks are in the project and what risks are the most important. And, above all, goal of risk allocation is to reduce the impact of the risks and therefore one needs to know how to manage the risks.

Hubbard states that:
- often people rely too much on human perception;
- certain methods for risk management have never been proven to work;
- some people analyse risks in a doubtful way;
- often one does not realise enough that lists of risks are always incomplete.

These four points will be discussed briefly below.

Human perception
In his book Hubbard (2009) lists the many researches that have been done on the reliability of expert knowledge. It is found that “humans misperceive and systematically underestimate risks”. This means that one should consider this underestimation when working with the information created by humans, such as estimates of probabilities of occurrence and sizes of consequences of risks. This does not mean one should not use this information at all – one often needs this information to get a view on the risks – but one should be more aware of the fact that this misperception and underestimation is a probable factor to be taken into account.

How do we know it works?
Hubbard (2009) also points out that there is no clarity on the effectiveness of risk management. In fact, “the risk management method itself has no performance measures at all”. He thinks it is strange that many people rely on a method that has never been proven to work.
The effectiveness of risk management is hard to prove: a successful project could be ‘just luck’ and a disappointing project could be a combination of disappointments (bad luck).

The analysis of risks
One of Hubbard’s major issues with the current risk management is the way people ‘treat’ risks. He founds this statement with the following points:
- **Risks should not simply be quantified by probability x loss**
  “Multiplying probability and loss assumes the decision maker is risk-neutral.” (Hubbard 2009) Most decision-makers are risk-averse and so this doesn’t fit. Hubbard gives the example of the choice between a certain payment of 5,000,- or the possibility to flip a coin and win 20,000,- on heads and lose 10,000,- on tails. The expected value both possibilities is 5000,- (5000*1 = -10,000*0,5+ 20,000*0,5) but for most people the options are not equal.
  This comment surely counts for the ‘listed risks’. That approach is based on the idea that the party that prices the risks the lowest can best manage the risk, but seen from this angle it allocates the risk with the least risk-averse party. This is not per definition the party that can reduce the impact of the risk the most.

- **A risk model should take as well discrete as continuous risks into account**
  Sometimes, Hubbard calls it the construction engineering definition, only special events (or ‘discrete risks’) are taken into account in a risk model. The ‘continuous risks’, such as fluctuation of steel prices or labour costs, should also be taken into account, as they can form a great amount of the final costs on risks. Often they are taken into account, but only as an uncertainty around the costs or planning. According to Hubbard the risk management in that way is not complete.
  When focusing on the biggest risks, it is important that this is taken into account; otherwise the project is not steered on the potential ‘biggest risks’.
  In the RISMAN-method which is often used in the Netherlands, this aspect is taken into account.

- **Ranking risks should be done carefully**
  The ranking of risks (in priority) can be done in many ways. This step is important to know which risks deserve the most attention. According to Hubbard three things can go wrong here, especially with using scales and matrices.
  Firstly, one should be sure not to multiply ordinal scales with each other (a risk with ‘category 5’-probability and a ‘category 3’-impact is a risk with ‘size 15’, which is about twice as big as a 4x2-risk – which might as well just be a little bit smaller on both aspects).
  Secondly, one should be careful with using boxes of probabilities or impacts. Gathering risks of a range of probabilities and a range of impacts together means one gathers enormous differences in sizes of risks under one heading.
  Finally, scales have all kinds of effects on how people judge the magnitude of a risk. For details, see the book of Hubbard.
You don’t know what you don’t know

The last point is in fact what is also pointed out in the first part of this chapter: often the things you don’t know are not enough taken into account. “A risk manager should always assume the list of considered risks, no matter how extensive, is incomplete.” (Hubbard 2009)

2.6.3 Strategic behaviour

A major threat for the approach for risk allocation is strategic behaviour (see 2.4 and also later in the expert interviews). Heuvelhof, Jong et al. (2009) state that the essence of strategic behaviour is that strategists do what they do to serve their own interest in a sly opportunistic manner, by camouflaging their intentions. Often two explanations can be given to their behaviour, one explaining that they serve their own narrow interest and the other explaining that they serve a broader interest. Of course to the outside world the strategists will explain their actions as serving a broader interest.

For example the following two explanations can be given of the same situation (a contractor that points out to the client that there is a mistake in the design):
- The contractor has kept information behind about errors in the design during the contract negotiations in order to be able to claim extra work (which is more expensive) later on.
- The contractor is trying to deliver what the client wants, but sees a mistake only after contract award which could lead to less qualitative work. Therefore he proposes the client an alternative which leads to a better result.

Three general breeding grounds for strategic behaviour are recognised (Heuvelhof, Jong et al. 2009):
- Fewness: a few companies dominate the market. This can lead to monopolistic behaviour, inefficiency and collusion.
- Position: as well an established position as acquiring a new position in a market can lead to strategic behaviour in the form of respectively predatory behaviour and cherry picking.
- Information asymmetry: difference in information provision creates possibilities for adverse selection and moral hazard.

The first two breeding grounds point towards situations on a market between competitors. The latter, information asymmetry, is more relevant for the risk allocation issue, because it focuses on the relation between principal (the client) and agent (the contractor).

A principal-agent relation has two specific characteristics. As said before, there is the information asymmetry between the actors: “although the principal is able to set the course and tell the agent what to do, the agent has relevant information that is needed to plot the course and evaluate whether things are moving in the right direction” (Heuvelhof, Jong et al. 2009). Secondly, there is a conflict of interests; “the principal wants the agent to behave in accordance with the principal’s wishes and interests, whereas the
agent will mainly regard their own interest as the guiding principle for their behaviour” (Heuvelhof, Jong et al. 2009).
As well the information asymmetry as the conflict of interests is discussed below.

**Information asymmetry**
The theory states that the information asymmetry is in favour of the agent. He is the one that knows how for example to construct a road and how much that will cost. He can use this in two ways: by adverse selection and moral hazard. These are explained below.
Nevertheless, the principle (client) has on some points more knowledge than the agent. At the start of the project or during the tender phase he knows more about the project, developments in the region and the current status of the area. A principle could also be able to use this advantage by strategic behaviour. Below the theory is discussed, with sometimes a remark to the information asymmetry the other way around.

**Adverse selection**
This behaviour occurs during the preparation of an agreement, such as a contract, an arrangement, a decision, etc. During the negotiations the agent has an information advantage and can keep some information behind. In this way the agent can steer the design of the arrangement in the direction of his favour. “This is how an arrangement comes into being that neither maximally serves the principal’s interest nor generates the optimal trade-off between the interests of principal and agent.” (Heuvelhof, Jong et al. 2009)
This means that it is difficult to see whether a proposal of a bidder (agent) during a tender phase is in favour of the project or in favour of the individual interests of that bidder. This can lead to a risk allocation that is not optimal for the project, but more advantageous for the agent. The same can be done by the principle: keeping information behind in order to have the arrangement in its advantage.
One has to realise this influence is a disadvantage for dialogues during the tender phase.

**Moral hazard**
When the arrangement is coming into effect the contractor can try to evade the arrangement, which generally harms the interests of the principal. The agent will try to hide certain actions from the principal and will, in case of performance agreements, score a flattering, good assessment, although his performance is less satisfactory on closer inspection. This behaviour is called moral hazard. (Heuvelhof, Jong et al. 2009)
This means for risk allocation that one has to take into account that a good division is not sufficient. A client (principal) should be able to check the behaviour of the contractor (agent) and act when moral hazard is shown.
As well adverse selection as moral hazard can be recognised in the ‘traditional’ construction sector, where for example extra work (not foreseen in the contract) became a standard.

**Conflict of interests**
The conflict of interests is already introduced in the first parts of this report with the value-price-costs model. The interest of the parties is to maximise their individual benefit of the project. This means the largest difference between value and price for the client and the largest difference between price and costs for the contractor. Such conflict of interest can lead to strategic behaviour.

As a client one can try to deal with this strategic behaviour by arranging the interest of the contractor in such a way that it is more aimed towards the interest of the project. This can be done in two ways: sharing (parts of) the project or coupling individual benefit to total benefit.

**Sharing**
Sharing can be done in two ways: sharing risks – by using a fund to pay the consequences of occurring risks (as explained in 2.3.2) – and sharing responsibilities – by working together in an alliance, which is a form of organisation –. In such alliance both parties work together on (part of) the project. An “out together, home together” idea can be created where the people within the alliance are not primarily striving for the interest of their company, but for the interest of the alliance itself. (Swanenberg and Haastregt 2007)

**Coupling individual benefit to total benefit**
The idea of coupling individual benefit to total benefit was already touched in 2.2.4. It was stated that when risk allocation is organised well, the drive to maximise individual benefit can be used to minimise the total cost of risk in a project. That should in fact help to deal with strategic behaviour caused by conflicting interests.

A way to couple value and price is proposed by Ridder and Vrijhoef (2007), by using value/price ratios within a ‘dynamic control space’ (figure 8). The idea is that the contract is awarded to the bidder with the highest value/price ratio – the steepest line between the initial bid and the origin (see figure) – and use this ratio for the final price. This price is determined based on the value delivered.
The contractor then has – within the contract area that lies around the initial design, value and price (grey area in figure) – the room to strive for the highest value, which gives him the highest price, and at the same time to deal with unforeseen circumstances.
This space (to deal with unforeseen circumstances) is not always given, according to Pleindoux, Ham et al. (2009) who think the current budgetary practice in the Netherlands is still too rigid for the constantly evolving project characteristics: “This rigidity is in many ways contradictory to the objective of value for money, which would demand a dynamic adaptation of established budgets, specifically in the risk allocation in light of the actual environment of a given project when under implementation.”

2.6.4 Dumping risks

In section 2.6.1 is stated that in each project there is an optimum in the division of responsibilities with a resulting division of risks, but there is critique on how this division sometimes is made. It seems more and more that large amounts of risks are transferred to the contracting party that sometimes cannot influence these risks (KinG 2009). Questions rise whether these risk transfers still raise value for money (Chung, Hensher et al. 2009) or that one can speak of “a politically convenient but economically dubious way of packaging infrastructure deals” (Quiggin 2006). Chung, Hensher et al. (2009) state about Australian PPP-projects that “market competition has transformed PPPs from an approach of risk guarantee by government to a paradigm of risk dumping by government”.

In fact, one can say that when extreme amounts of risks are transferred, more risks are created in the form of large premiums and disputes during the realisation. That is why it is important to look for the optimal division of responsibilities and risks.
2.7 Summary: requisites and context variables

2.7.1 Requisites

In the literature on risk allocation two recurring points can be recognised:
- the need for understanding of the allocation by both parties
- the consideration whether allocation decisions lead to value for money

The latter refers back to the value-price-cost model which was introduced in chapter 1. It is important to keep in mind that all allocation decisions should lead to the largest benefit for the project (value - costs) in the first place and a reasonable price in the second place.

Combining this with the other important points discussed in the literature, the following requisites for risk allocation are found:
- Identification of risks has to be done explicitly and by both parties
- As many as possible of the unnecessary risks need to be eliminated through proper organisation and preconstruction planning
- The risks and the initial allocation should be discussable
- Identified risks are allocated using the following criteria:
  - Whether a party has the competence to foresee and assess (the magnitude of the probability and the consequence of) the risk.
  - Whether the party has the expertise and the ability to influence the cause or the consequences of a risk.
  - Whether a party has enough bearing capacity to sustain the consequences of a risk.
  - Whether a party is motivated – for example by a reasonable premium or a social responsibility – to bear the risk.
- Unidentified risks need to be allocated:
  - Unknown knowns: the literature is not clear about this; expert interviews need to give more information on this.
  - Unknown unknowns could be managed by Joint Risk Management (“sharing”)
- The allocation has to be based on the “value for money” principle
- Both parties need to have the same understanding of the risks and the allocation
- Focus on the 20% biggest risks (efficiency)

Based on criticism is added to that:
- One should start risk allocation with the division of responsibilities and base the division of risks on that.
- Risk management can reduce the impact of risks, but one should also realise what the risk of using risk management is.
- When dealing with risk allocation one has to take into account the effect of strategic behaviour.
- Transferring large (unreasonable) amounts of risks creates new risks.
2.7.2 Context variables

This research is designed to get a better view on risk allocation. Already in the introduction is said that every project is different and that this has influence on the risk allocation.

Case study research, which is used in this research, is a form of research that takes the influence of the context into account (Yin 1994). It is therefore important to have a clear view on which context variables need to be taken into account.

Context variables are in fact aspects of a project that influence the way in which risk allocation should be organised to have a good result.

Besides the three variables given in the introduction (risk profile, form of contract and type of actors) the available literature provides no other usable variables. The expert interviews will need to give a more complete view on the theory of risk allocation.
3 Expert interviews

The expert interviews need to complement – and sometimes adjust – the theory derived from the literature. Because the literature did not provide enough information on the context variables, this has got large attention in the interviews. The interviewees are asked about their experiences and their opinion on the theory (except for section 2.6). In appendix A the summary of this theory and the (Dutch) approach of the interviews can be found. For the interviews people with different experiences are questioned. These are as well (advisers) from the client side as from the contractor side of projects. This chapter discusses the results; both general comments on risk allocation as the by the respondent observed context variables.

3.1 Expert interviews

3.1.1 Fianne Lindenaar

Fianne Lindenaar has experience as risk manager in several projects and works as consultant for Rijkswaterstaat. She is involved in the projects for Ruimte voor de Rivieren and Maaswerken.

General comments on risk allocation

The agreed risk allocation is often understood well by both parties (there is a ‘meeting of minds’), but later on in the project it leads to problems as the interests of the parties differ. It therefore is not only important to make sure the parties understand each other, but also that the allocation is sharply defined. This implies that risks should not be formulated too broad, but that they should be defined specifically for a situation.

Thorough preparation in the pre-contractual phase is very important in risk allocation. This preparation involves the identification of risks – as many as possible – and a well-thought risk allocation. Not only single risks should be taken into account, but also scenarios with combinations of risks. These combinations of more risks at the same time often lead to the highest risks and the biggest problems. Best is when the involved people try to crack there own allocation. In that way one finds the forgotten areas.

The possibilities to discuss the initial risk allocation with the bidders are limited by legal rules. This makes the whole process less flexible than the theories prescribes.
One has to take into account that it is not possible to arrange everything in advance. Much more important is that the contract arranges how one has to deal with situations in which something goes wrong.

**Context variables**
- Degree of time pressure: time pressure can result in a too little investment in the preparation phase or can lead to the decision to skip certain actions necessary for a good allocation process.
- Client culture
  - Method of steering: are representatives of the client accounted on bid price, project result or something else?
  - Experience with risk management and integrated contracts within the organisation.
  - Trust in ‘standard’ general conditions.
  - Policy on tendering procedures.
  - Awareness of the importance of (certain steps within) risk allocation.
- Project culture
  - Degree of ‘risk-thinking’ in the project: in the people and the organisation
  - Degree of possibility/willingness to allocate explicitly (often it is only done implicitly)
- Complexity of the project
  - Technical complexity
  - Complexity in interfaces: lot of parties, permits, interfaces with surroundings
- Uncertainty about project at the start: sometimes it is not possible to reduce the uncertainty or it is not worth investing more in reducing uncertainty.
- Size (+ complexity): are the transaction costs of the allocation process worth the quality improvement of the risk allocation?

### Rutger Visser

Rutger Visser has been involved as risk manager on behalf of Rijkswaterstaat in the tender phase of some large infrastructural road projects. He was responsible for the risk management and in that way also for the process on ‘listed risks’. He has been involved in the following projects:
- Tweede Coentunnel/Westrandweg (DBFM contract)
- A4 Burgerveen - Leiden (D&C contract)
- A12 Utrecht Lunetten - Veenendaal (DBFM contract)

**General comments on risk allocation**

Conflicting interests is one of the most important issues that have influence on the risk allocation. These are present as well between the client and the bidders as within the client organisation.
The first – conflicting interests between client and bidders – results in strategic behaviour at several levels: the willingness to have discussions on risk allocation, the degree in which bidders will identify (new) risks and the extreme aim of the client when starting negotiations.

The latter – conflicting interests within the client organisation – appears between different parts of an organisation, as for example the planners and the operation department.

To come to a good risk allocation, discussion between the client and the bidders is very important. The fact that these discussions, by a competitive dialogue, are an explicit part of the Dutch ‘listed risks’ system is an advantage for that approach. In this way there is room to discuss whether both parties agree on the allocation itself, the scope of the risks (on the risk list) and the description of it in the contract. For certain discussions the project organisation (client side) should use people that are open towards the bidders. Unfortunately the method of ‘listed risks’ is also strongly influenced by conflicting interests. Consequently, the system is not always used in the way it should be and is therefore less effective.

Also the identification of risks by both parties – by asking the bidders for their risk analysis – is a useful way to check whether both parties have the same idea about the risk allocation and to identify new risks. The latter doesn’t happen often, as stated before, because the conflicting interests.

The result of risk allocation is better when there is not much ambiguity between attitude of the client during the tender phase and the realisation phase (for example tough and strict in the tender phase, but easy and flexible in the realisation phase). This creates contrarieties and will be used by the contractor to gain from the different situations.

For all parties it would be better when explicit risk allocation processes are also used in smaller projects. By doing this mostly with very complex projects, one is ‘learning to climb mountains on the Mount Everest’.

**Context variables**

- **Singularity:** the uniqueness of a project is a measure of the degree of case law available on a certain project. The less unique a project is, the easier it is to use ‘lessons learned’ on that kind of project.

- **Project organisation:**
  - **Heterogeneity:** a mix between conservative people and ‘believers’ is a much more fruitful situation for negotiations towards an optimal risk allocation than when the project organisation is homogeneous. One has to take into account that not only the composition of the team should be heterogeneous, but that this diversity has to be used during the tender phase (involve the right people on the right moments).
Continuity: through the process – as stated above – it is important that the client has one ‘face’ and therefore it is necessary that the project organisation does not change completely when the realisation starts.

- Degree of margin in the project: when a project is fully set in terms of time, physical scope, etc. there is no margin (solution space) for the bidders to play with. Then there is no gain in dealing with risks creatively and looking for optimisation, and therefore bidders will not like to bear risks.

- Size: the bigger the project, the more attention for risk allocation. This is not necessarily how it should be.

- Sector: the degree of trust between client and bidders differs among various sectors. In the Dutch infrastructure, the road sector is more developed towards dialoguing with the bidders than the hydraulic sector or the rail sector. This also determines the willingness of the client to give the bidders some room to come with suggestions.

3.1.3 Jan Ochtman

Jan Ochtman has been involved in some large construction projects in the Netherlands at the client side. He was Deputy Project Director of the Dutch High Speed Rail Link. As such he was responsible for the DBFM contract for the HSL-systems. As negotiation manager he was in charge of the contracting process of the PPP-A59 road DBFM contract. Other projects are the Tweede Maasvlakte and the A4 road project.

General comments on risk allocation

Efficiency is important in the risk allocation process. To improve, not only the question “what can be done better?” but also the question “where can we reduce?” is useful. The threat here is that people try to be complete by listing all possible risks, regardless of their likelihood. In that case risk management becomes a burden.

For all parties involved in the process, expertise is an important ingredient. A client with a lack of expertise will sooner misunderstand the other parties which is a basis for distrust (one cannot be sure of rational action during the whole project). Bidders with lack of knowledge can delay the process by making problems of non-issues or will accept risks that they do not understand, which can lead to problems later in the project.

The process of risk allocation needs to be explicitly mentioned in the early stages of a negotiation process. There has to be time available for discussion and one has to be open for the result of a discussion. This can only be done when the top of the organisation is truly motivated to apply risk management and implements this in the rest of the organisation (top-down). The more integral the risk-thinking is incorporated in the organisation the better the result of the allocation process can be.
It can be effective to put all risks with the contractor in the initial risk allocation, provided that one has made clear that this is – to some extent – open for discussion. The result of this is that the bidders will early start to think about risks and their responsibility. However, using approaches which are uncommon in the sector needs extra care. During the process one has to monitor whether all parties understand what is meant and whether the idea of such approach lands with all parties.

Not only understanding risks and the risk allocation, but also the meaning of this for the other party is very important in the negotiation phase. If the client does not understand the risks, or the importance of each for the bidders, he will be disappointed by the bid price. He will also not be able to anticipate on the other consequences of the risk allocation, such as the impact on the form of organisation.

The systematic of pricing risks in competition can be very clarifying and useful, as long as it is used in the way in which it is intended. When the system is misused, it has no value and is a waste of time and effort.

The client has to prepare a thorough initial risk analysis and a target allocation, but should subsequently be prepared to adapt this allocation in discussion with bidders. Only then there is room for (creative) solutions and is a negotiation process useful. In an open discussion, parties should also be able to point each other on the risks they bear (instead of trying to leave it unnoticed).

One has to realise that you cannot know everything and accept that you don’t know what you don’t know. Most important is that the project continues, also when an unidentified risk occurs. When the contract is drawn up, one can take care of these ‘unknown unknowns’ by creating the trust that the consequences will be dealt with in a fair way, as long as the impact on the project will be reduced as much as possible.

**Context variables**
- Degree of risk-thinking: the more *integrrally* incorporated and *top-down* motivated the better the result.
- (In)competence of the parties.
- Policy of the client organisation: possibility to discuss risk allocation.
- Time pressure: investment in preparation phase.

### 3.1.4 Jan van de Ven

Jan van de Ven is responsible for the procurement of new contracts and involved with the development of concepts for maintenance and management of national and provincial roads for the contractor Heijmans.
General comments on risk allocation
The process of risk allocation is in each project organised differently. Some projects of Rijkswaterstaat have a limited allocation process – for example a single market consultation and an information phase – and still end in a very good and reasonable allocation, while other projects can have an extensive phase – with several market consultations, dialogues and a process with ‘listed risks’ – and still end up in an unreasonable allocation. Here, one has to take into account the aspect of efficiency. If such an extensive allocation phase is used, there is the pitfall of investing large amounts of time, energy and money without the result being worth it. Whether the process of risk allocation is done explicitly does not necessarily matter. But one has to take into account that when it is not done explicitly, more discussions can arise on unclear statements in the contract later in the project.

The largest risk for a contractor is the uncertainty around the client on how he will read the contract later in the process. This comes from the fact the client in the tender phase often believes in some ‘makable world’ that can be tied down in a contract. During the execution phase one finds out that it is not that simple and that things turn out to be different and more flexibility is required to come to a successful outcome. Another aspect that is important here is the fact that – although they are from the same client – the people who write the contract are not the ones that execute it. Also with contractors there are different people in the tender phase than in the execution phase.

The allocation of risks with a small chance of occurrence and a large impact are the most difficult to allocate. If they are difficult to manage by either party, they can not properly be priced. When the pricing of these risks is done in competition, the problem becomes even worse. It would be better when these risks are shared between the client and the contractor.

A market sounding or dialogue phase might induce bidders to think actively about risks. A good identification of risks is the most important step of risk allocation. It seems that for a long time it is unclear whether something is a risk or not. It would be better when more energy is put into searching for more information. In that way the quality of the risk allocation is improved.

There are always things that you can not foresee. It is important that both parties then have the confidence that this will be discussed in a dialogue. In that way the execution of the project can continue. This confidence need to come from the people and the companies that are involved in the project.

A contractor is a commercial business that wants to profit from a project. Often the people at the client side do not fully understand these commercial interests.
When the parties do not understand each other’s stakes, the negotiations are more difficult. Image – and especially the image of the minister – turns out to be a very important factor in project of Rijkswaterstaat.

In the presented theory there is friction between efficiency (focus on 20% biggest risks) and the will to reduce the amount of unidentified risks. Besides, the check for ‘value for money’ can not be done for the allocation of unidentified risks.

For a contractor, bearing risks is not a problem – that’s business – as long as he can bear and influence the risk. There has to be something to win by bearing the risk and it should not lead the company to bankruptcy.

**Context variables**
- The culture of the project organisation (of both parties) and the companies behind them.
- Size: this matters for the criterion of ‘bearing capacity’. The importance of this criterion depends on the size of a project. In a small project risks can easily be diversified with other projects of that company, but large risks of a large project can be too much for that company and thus cannot be borne.
- Singularity: risk allocation in a unique project should get more attention, while a ‘standard’ project should use ‘standard’ contracts and conditions.

### 3.1.5 Rob Vos

Rob Vos has been involved with several projects at the contractor side. A selection of projects:
- Project engineer for the High Speed Rail Link (Van Hattum en Blankevoort)
- Project leader for the NoordZuidlijn Passage Amsterdam CS (Strukton)
- Tender manager for KARGO RWS (maintenance and renovation for eight bridges) (GMB)

**General comments on risk allocation**

Allocating risks starts with the step of the client towards the market. Before that moment, all risks are with the client. Once he asks something from the market, he can transfer – within that assignment – risks towards the market. In that way, only risks within the range of influence of the contractor are transferred. For successful risk allocation it is necessary that only risks that can be influenced are allocated to the contractor.

The bigger the freedom in the assignment for the market, the easier the contractor can deal with risks. In that case there is more room for creative solutions, the contractor is responsible for the design (and accompanying risks) and thus can risks easier be dealt with: the contractor can decide what solution he chooses and how he deals with the accompanying risks. In that way he can try
to save money by dealing with the risks in a good way and so creating more profit.

Communication about risks and an open approach towards risks is necessary for good cooperation between client and contractor. This should at least be done after contract award. The best way to do this is by using a joint risk list in the execution phase.

Before the contract award it is more difficult to openly communicate about risks. In that phase it is not in the interest of the bidders to talk about the risks they identified (confidential information should not be shared with competitors), at least not during plenary information rounds. Nevertheless, it is possible in this phase for the client to organise confidential meetings with the different bidders. Then it is easier for the bidders to share information. The client still has to watch the level playing field for the competing bidders. These meetings can best be a little bit informal, because then both parties talk more easy about their ideas.

A dialogue is needed to come to a good risk allocation. This cannot be reached when the only conversation is done by writing.

With this communication on risks and by using a joint risk list both parties can show each other what their ‘fears’ are. At some point the parties can ‘relieve’ each other by taking over risks that are not such a fear for themselves. This shows the importance to take into account the difference of viewpoint: what is a big risk for one person might be marginal for the other.

Unfortunately there are still parties (organisations) that are not open for such dialogues. In those cases it is harder to have open communication.

It can be helpful for the process to ask bidders during the tender phase for a ‘risk file’, this can be a push to start to work with risks. Especially when the quality of such risk file can lead to a discount on the bid price (by using a Most Economically Advantageous Tender criterion) this works really as a trigger.

In such file it is important that also is made clear how and when one is going to deal with certain risks. Only when that is communicated, the other party can be relieved from its worries.

When risks occur that were not foreseen (the unknown things) two situations are possible: from case law is made clear that one party should have taken care of this risk (unknown known) or it was a real unknown unknown. In the first case that party has to bear the risk, but one has also to make sure that the confidence in the risk management is not lost. In the second case – the unexpected and unforeseeable event – the consequences should be borne by the client (he was the one that wanted the project in the first place). Still, when there is more freedom in the assignment, the willingness of the contractor to share such risks will be bigger. This has again to deal with influence: the more room for solutions, the more influence on those risks.
Actions that are based on strategic reasons are indeed important and conflicting interests will always remain. Trust is the only way to reduce these strategic actions.

Understanding each other is very important. A risk can be ‘identified’ but you still don’t know whether everybody means the same with it.

The 20/80-rule that is mentioned for efficiency does only apply to decide for which risks action is needed. It is necessary to be as complete as possible in the identification of risks.

The ‘elimination-step’ in the theory does not fit in the picture: first of all there will always remain risk on organisation and planning and secondly this is a step for risk management, which assumes that more aspects should be taken into account.

**Context variables**
- Degree of margin in the project: as well in the scope of a project (whether or not a project is fully set in terms of time, physical scope, etc.) as in the process towards contract closure (possibilities for dialogues, questions, conversations, etc.)
- Complexity (especially with interfaces): the more complex the assignment, the bigger the ‘push’ towards risk-thinking.
- The culture of the project organisation (of both parties) and the companies behind them.
- The competence of the parties: does a party really know what risk it bears? Both parties need to speak the same (technical and process) language.

3.1.6 **Richard Hartmann**

Richard Hartmann has been involved in many tenders for Rijkswaterstaat at the Dienst Infrastructuur. He is now contract manager for the project Noordwaard, part of the program ‘Ruimte voor de Rivieren’.

**General comments on risk allocation**

In projects one cannot steer on time, quality and money at the same time. There is always a focus on one or two of these aspects. This has large influence on the risk allocation, but also on the allocation process.

The form of contract is in fact a result of the risk allocation. One should first decide how risks could best be allocated for this project and with that result choose for a form of contract. This contract can best be set up from a standard form to have uniformity towards the market. Besides, standard forms of contract are discussed with the market and are accepted by the market parties. Fine-tuning is necessary for some small risks.
Within the boundaries given by the organisation, each project should make its own considerations. A great part of the allocation can be derived from case law.

Unforeseen risks that are not part of the responsibility of one party should not be transferred. In the end they always become the problem of the client. Beside that, transferring such risks hurts the relation with the contractor which has a negative effect on the rest of the project.

As client, such as Rijkswaterstaat, one should be able when using experience and reasonability to come to a sufficient risk allocation. This should be good enough for the project. Still, one should be open towards the market during information phases to be able to make adjustments if necessary.

The risk profile of a project has large influence on the risk allocation. It can differ strongly whether the focus in a project lies within technique, surroundings or planning (procedures). On each of these aspects the will and possibility to transfer risks is different.

Whether or not transferring risks is for a large part determined by the fact that Rijkswaterstaat always remains responsible towards the society. Therefore image and social responsibility are very important. On some points one should specify more precisely what the wishes are to be sure the interests of Rijkswaterstaat are covered.

But the more responsibilities given to the market, the more room for solutions is created and the more risks can be transferred.

There is tension between the degree of specification and the managing of planning risks. Rijkswaterstaat should not transfer planning responsibilities and risks (such as the Track Decision), but, to be able to manage these risks, one has to make certain designs and take certain decisions. This reduces the freedom for the contractor later on.

These planning risks can not be transferred, because the consequences of the planning decisions are that large that they cannot be estimated by the market. A fixed price is not possible if one decides to transfer those risks. Permit risks can be transferred towards the market.

There are situations where the planning procedures are interwoven with the tender procedure. The solutions of the bidders are then taken into the planning procedure as alternatives. One has to watch out for cherry picking in this case.

Discussing risk allocation with the market is difficult, because during market consultations bidders will not share information with each other. An individual dialogue is a solution for this. Such dialogue can definitely contribute to the quality of the risk allocation.

In such dialogue parties can get a good view on each other’s interests and fears in the specific project. This can improve the risk allocation, but also the
relation between the parties. A project can be a success when there is synergy between the parties. The understanding of each other’s interests is important: where Rijkswaterstaat is thinking about the end situation and its quality and fears problems with time and image, while the market parties are searching to find clever solutions to make money and fear risks of price increase and risks without a cap. This information can get the project to a higher level: Rijkswaterstaat is willing to pay more for a solution that reduces certain risks (such as traffic hindrance or time delay).

A basis for success is a good preparation by the client. When sufficient study is done on the risk profile and the proposed contract is worked out well, one has a good starting point to work with. Besides, a good project organisation is necessary. This means the right people, but even more important is the organisation of the team.

For efficiency the qualitative risk analysis is important: is it as complete as possible? Unforeseen risks have often the highest impact, because one was not prepared for it. The overall steering of the project has to be on the top ten risks. In the allocation process the focus should be on the ‘grey-area risks’, not on the risks that fall obviously under the responsibility of one of the parties.

**Context variables**
- Risk profile of the project
- Project organisation

3.1.7 **Martin Bos**

Martin Bos is project manager for the contractor Strukton. He is now working as project director of the under-crossing of the Amsterdam Central Station for the North/South subway-line.

**General comments on risk allocation**
The degree of cooperation between client and supplier is an essential part of dealing with risks. In some projects there is a regular meeting between client and contractor to talk about the major risks (top 5 or 10) that are important for both parties. In other projects there is less contact between the parties, which makes the risks harder to control. Which risks are discussed in these meetings very much depends on the type of contract and where the transition of responsibilities between client and contractor is.

The current situation is that bidders do their offer for the specifications given by the client. In fact, these bids never fit into the budget of the client. Negotiations start on the price, which often means that risks are transferred from the contractor to the client until the price of the project falls within the budget.
During the realisation these transferred risks lead to problems and higher costs. This means in the end the client still pays the higher price.

What is stated here is in fact that risks are allocated independently of the responsibilities. This does not necessarily lead to vagueness, but it does lead to problems when a change of context occurs. A contractual dispute is created, which could in the end lead to the fall of the project. These disputes have the origin in the fact that both parties agree on what has to be build, but do not agree by which way.

It would be better if there was not so much arguing on certain risks. This could be realised by more collaboration and an early involvement of the contractor. In that way there would be more clarity on the division of responsibilities. Also, with early involvement the contractor can make the design, which is for him more workable than a design of the client. An alliance contract for some parts of the project could be the right form for this. This would be useful for parts of a project where beforehand it is not clear what the exact context is and how it will react on the construction and things that have never been done before. An alliance form is especially useful for very vague or complex projects.

The advantage of an alliance is the collective steering on risks.

Requisites for good risk allocation are – as said – an early involvement of the contractor and mostly openness. Both parties need to be honest about risks. Collaboration will be the only way to come to success in today’s complex projects.

It seems that all these things are blocked by legal rules, politics and image. The rules hinder the early involvement of contractors. Politics create the problem of shifting risks back and forth, because the bids don’t fit the budget. And the bad image of the contractor won’t create a lot of trust which is needed for an open approach.

The ‘new thinking’ is being developed, but is really has to grow into the organisations (as well clients as contractors), as everyone is used to work on a certain way.

3.1.8 Han Vrijling

The activities of Professor Vrijling – Probabilistic Design and Hydraulic and Structures, Delft University of Technology – in the field of probabilistic design resulted in a large input of the Delft University in the discussion of acceptable risks in society. Professor Vrijling was recently appointed as a member of the Veerman committee that studied the future of the new metro line in Amsterdam. Construction of this North/South subway-line was stopped because of new financial prognoses as a result of damage to adjoining houses.
General comments on risk allocation

One should not talk about the allocation of risks, but about the allocation of consequences, as risks consist of a probability and a consequence. Only consequences can be attributed to someone but not the probabilities (it is either someone’s fault or not).

This should be compared with the insurance industry where the insured pays a premium to receive compensation in case an uncertain event occurs (for example burning down of the insured’s house). The word *uncertain* is important here, as a deliberately caused event by the insured (for example arson) makes the right for the compensation invalid.

In this example not the risk (cause and effect) of the fire is allocated, but only the effect of the risk event is allocated to the insurer. This all is a matter of using the right definitions.

In general there is too little knowledge about the mathematical background of risks. Often one does not understand the results given by the mathematical models. It seems that not even an alarm is sounding when models show a project has only 5% chance of being on time or within budget.

Another point is that there is too much confidence in technology; one often thinks everything is to be solved.

Looking at what happens in a project, the first step is the decision to start with a project. Here, far too big risks are taken. It seems that decision makers are not capable of judging the risks well.

To take a good decision one needs a sound cost/benefit position and secondly a good risk analysis. What often is forgotten when doing a risk analysis is that a good description of the system (what is part of the project and the risk analysis?), the viewpoint (for whom is this risk analysis done?) and the goal of the project and the risk analysis (do you look at time, money or something else?) are needed to do a good risk analysis.

Politicians have their own specific way of dealing with risks and the results of risk analyses: the results are used when they suit the politicians well, but there is critique on the analyses when the results are not that convenient. By disguising the results more often too big risks are taken by starting certain projects.

The second step is putting a project on the market. The current approach of Rijkswaterstaat “the market, unless…” is a good approach, but one has to realise that creates an extra market mechanism: the contractors are testing how the client is reacting on unforeseen circumstances and pressure from the contractor. They discover that far too often the client is willing to save the contractor when things go wrong. This means next time they will take more risks as they know they will be saved when things go wrong.

Here again it would be better when the client has more knowledge or hires more knowledge, so he knows what things can go wrong and how he will deal with that.
One can see that transferring most of the work towards the contractor is nowadays a ‘must’ as politically other forms of contract are not accepted and some clients (like municipalities) became incapable for doing things themselves (such as designing).

The client should transfer a large share of the responsibilities to qualitatively good contractors and accept the price that comes with it. That price will pay for itself: if one is pushing the price beneath a certain level you will end up with an incompetent lowest bidder and high risks taken back for small price reductions. In other words: stay with your decision about what to transfer and accept the corresponding price.

Again, a good team with a lot of experience is needed at the client side.

But in any case the question remains: how solid is the contract? You always have the risk of failure of the law.

3.2 Summary: requisites and context variables

3.2.1 Additions to or sharpening of requisites

The first part of the theory – the literature search – was already summarised in section 2.7. Some points of the literature didn’t seem to be relevant for the experts and some aspects pointed by the experts weren’t recognised in the literature.

The following aspects can be added to the aspects mentioned in the summary of last chapter:

- The client has to invest in the pre-contractual phase to reduce uncertainties on scope and possible risks
- Bidders should be stimulated to think about risks
- Process agreements should be made for the occurrence of unforeseen risks and unknown knowns are mostly dealt with by case law.
- A (verbal) dialogue is needed to discuss the allocation
- Parties need to understand each other’s interests and fears
- The project organisation (of both parties) should be:
  - Continuous (smooth transition between tender and execution)
  - Competent (have the necessary knowledge on technique and process)
  - Heterogeneous (as well conservative people as believers) – particularly the client
- Identified risk should be allocated mostly on the criterion of ‘influence’ and the criterion of ‘bearing capacity’ should always be taken into account.
- Clients should keep to the decision about what is transferred and accept the corresponding price.
3.2.2 Context variables

In the expert interviews many context variables are mentioned that influence the process and result of risk allocation. These can be summarised to the following list of ten variables:

- The culture of the project organisation (of both parties) and the companies behind them
- Sector
- Project organisation
- Singularity of the project
- Solution space of the project
- Margin in time and budget
- Complexity of the project
  - Technical complexity
  - Complexity in interfaces
- Uncertainty about project at the start
- Degree of risk-thinking
- (In)competence of the parties
- Size of the project

These variables will be used in the case study.
4 Propositions

Chapter 2 and 3 gave a lot of information about requisites for effective and efficient risk allocation and context variables that influence the process and result of risk allocation. With this information an answer on the first two research questions is given in the summaries of both chapters:

- What are requisites for an effective and efficient risk allocation according to literature and experts?
- What context variables influence the process and the result of risk allocation according to literature and experts?

The used sources – literature with different opinions and experts with different viewpoints – give a differentiated view on the topic. To be able to use this information in the next phase a selection is made of all this information. This is translated to a few propositions that will be used in the case studies. These propositions are useful to give an answer on the third research question.

- What do cases show about these requisites (translated into propositions based on the requisites for effective and efficient risk allocation, dealing with the allocation process and the result of the project) and important context variables?

This chapter will give a chronological overview of these propositions. To have these propositions sharply formulated the goal of risk allocation is repeated here.

4.1 Goal of risk allocation

The effect of risks can influence the total benefit of a project in a negative way. This can be in terms of time, money or quality. Risk management aims to reduce the chance of risks to occur and the possible effect of it. But to manage risks effectively one has to know who is responsible for taking the response actions and do the monitoring and who bears the consequences when the risk event occurs.

So the goal of risk allocation is to have the project risks allocated in such a way that the total impact of the risks on the project objectives will be minimised. This means less money, time or quality is lost due to occurring risks. In the end this leads to a higher total benefit for the project. When this is combined with a reasonable price that matches the division of responsibilities and risks also the benefit for the individual parties is optimised.
It should be clear that minimising the possible impact of the risks is twofold. It means the risks should be allocated to the right party (effective allocation), but time and resource inputs during the negotiation process should still yield value for money (efficient allocation).

4.2 Propositions

4.2.1 Clear and strict division that minimises risks

In section 2.6.1 is explained that a clear and strict division of responsibilities minimises the misunderstanding – or the possibilities to pretend to misunderstand – of what is arranged in the contract. One can use catch-alls instead of individual risks to make clear who is responsible for what. An example of a catch-all is the statement in the Dutch DBFM contract: all risks are with the contractor, unless explicitly mentioned otherwise. Or the proposal of the LBC: the contractor is responsible for the object and the client for the interaction between the context and the object.

In this way one does not need to care about unidentified risks, as they will in fact always ‘fall’ within one of the allocated responsibilities. Besides, risks lie within the responsibility of a party, which is therefore generally able to influence the risk.

**Proposition 1a** Using a clear and strict division of responsibilities leads to a more efficient risk allocation.

One should recognise here the difference between a task and a responsibility. A task is “a piece of work to be done, especially one done regularly, unwillingly or with difficulty”, while a responsibility is “something that it is your job or duty to deal with”. In the words ‘dealing with’ lie the risks: whatever happens that makes the work more difficult; you need to deal with it.

The difference between task and responsibility is also between the traditional approach of the client of making specifications and exactly prescribing what tasks the contractor has to do and the more integrated approach in which the contractor is responsible for the delivered end situation.

Generally, one could state that responsibility = task + risks.

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2 Definitions from the Cambridge Advanced Learner's Dictionary
It seems therefore only possible to bear risks if you have the freedom to deal with whatever happens.

As stated before, the optimal division between the responsibility of the client and the responsibility of the contractor differs per project. This decision depends on how much the client already knows, what he wants, what he is able to do himself and what other parties are able to do, and how clear the wishes of the client are.

The most important aspect here is that this decision indeed is based on the search for the optimal location of the transition between client and contractor and not the most desirable location, for example purely based on policy or political wishes. The location is optimal when it ‘creates’ the least risks. Creating risks can for example be done by transferring risks that cannot be borne by the other party as explained in 2.2.2, 2.6.4 and the expert interviews. Some examples are given to illustrate this:

- If the client knows exactly what he wants he can better just ask for it and give clear specifications for the design. By giving the contractor the responsibility for the design, one creates all kinds of risks such as perception risks: both parties having another object in mind.
- If a part of the project – for example the design of the object – very much depends on the knowledge and/or wishes of both parties, the client should consider sharing the responsibility in that part.
- Awarding a contract which includes a very long period of maintenance for a fixed price and a fixed output, can create a lot of risks for both parties if they do not know what happens in the future and what will be the necessary functionality of the object on a point in the future (Ridder and Vrijhoef 2007). This will lead to high premiums (Loosemore 2007) and the risk of losing capacity to alter the contract terms to meet changing needs and circumstances (Quiggin 2006).

Making this decision is an intern process of the client\(^3\). Market consultation can help the client to make a conscious decision.

**Proposition 1b** Using an optimal division of responsibilities (i.e. one that does not create more risks than necessary) leads to a more effective risk allocation.

It should be clear that sharing (for example in an alliance) also is a way of allocating risks. One should then look for an optimal division over three parties

\(^3\) Rijkswaterstaat and Twynstra Gudde have developed a decision model for this decision: Rijkswaterstaat and TwynstraGudde (2002). Afwegingsmodel Inkoopproces, ’s-Gravenhage, Rijkswaterstaat.
and make the division between those parties clear and strict. This is shown in figure 10.

![Figure 10 Division of responsibilities with three parties](image)

4.2.2 Allocating transition risks

![Figure 11 Allocating transition risks](image)

As described in the earlier parts of phase 1 (sections 2.1, 2.2.1, 2.4 and the expert interviews), it is very important for the success of risk allocation that both parties understand the allocation and each other’s interests and fears and that discussion on these issues between the parties is possible. Introducing a dialogue in this allocation process can deal with these points and reinforce the clarity and simplicity of the first step of the process. The goal of this dialogue is to discuss the risks on the transition between the responsibility of the client and the responsibility of the contractor (i.e. ‘transition risks’). By discussing these, the exact division between the responsibilities becomes sharper and misunderstandings about them become less likely. Also any impossibilities or irrationalities can be discussed here. Furthermore in such discussion the fears and interests of both parties are clarified.

Other mentioned advantages of a dialogue, such as creating trust and involving the contractor early in the process and have him start to think about risks, are also taken into account. A dialogue does not necessarily need to take place in the tender phase, but can also take place after the award of the contract.

Proposition 2a A dialogue on the transition risks leads to a more effective risk allocation.

Allocation criteria

The risks that lie on the transition between the responsibility of the client and of the contractor should be allocated by using the criteria introduced in the literature search (section 2.2).
The order of the criteria is determined based on results of the expert interviews:

1. Whether the party has the *expertise and the ability to influence* the cause or the consequences of a risk.
2. Whether a party has enough *bearing capacity to sustain* the consequences of a risk.
3. Whether a party is or can be *motivated* – for example by a reasonable premium or a social responsibility – to bear the risk.
4. Whether a party has the *competence to foresee and assess* (the size of the probability and the consequence of) the risk.

*How* the party is motivated to bear the risk in a good manner is explained later in this chapter.

One should take into account that often other influences might take control over the allocation of risks – more than the mentioned criteria – such as economics, commercial requirements, debt financier’s requirements, bargaining power and company culture and policies (Loosemore 2007) and presentational and accounting considerations (Quiggin 2006). These aspects do not necessarily contribute to an optimal allocation of risks and maybe also should not have large influence on the allocation of specific risks, but should still kept in mind.

**Proposition 2b** Allocating risks based on the allocation criteria (expertise and ability to influence, bearing capacity to sustain, motivation to bear, competence to foresee and assess) leads to a more effective risk allocation

**Pricing remaining risks**

Sometimes the method of pricing individual risks (‘listed risks’) is used to find out “which party is best able to manage the risk”. The assumption is that the party that prices a risk the lowest is best able to manage it (Rijksoverheid 2009). This however is a tricky statement, as this pricing is not only based on ‘manageability’.

First of all, as Hubbard already stated (see 2.6.1), allocating risk based on pricing gives the parties the following choice:

- ‘loose’/pay a certain amount and have the risk borne by the other party
- risk a chance of losing a lot in exchange for that certain amount of money

Imagine, for example, you are a contractor and you have the possibility to price a certain risk which you assess on a 10% probability, with an impact of 1000,- after a mitigation that costs 50,-. This means you have a probability of 90% for only paying the costs of the mitigation and a probability of 10% for paying the mitigation costs and the impact of the risk, being 1000,-. That would mean you would assess the risk on 0,9*50+0,1*1050 = 150,-. If you would price it 150,- you would be absolutely risk neutral. This means you would just as well accept doing a certain payment of 150,- as the possibility of 10% on losing 900,- and
90% on winning 100. This price also reflects how much the bearing of that risk cost that party.

Most parties are not exactly risk neutral. Often parties, clients in particular, are risk averse (see 1.2.2). This would mean they rather choose for a higher certain payment than for taking the risk. This already means that the pricing of the risk is not only based on the manageability of the risk, but is already blurred by the so-called ‘risk preference’. Besides, in these cases, the contractor is also asked to price in competition. This pushes him into the risk-seeking position. This effect is even stronger when there is a tight market and the contractors all need that work very much. One can see that the original arguments to use pricing of risks fade by these effects, which means the total benefit of the project is not served in the first place. This can for example be seen in the ‘Tweede Coentunnel’ project where in the evaluation was concluded that a risk (delay in Track Decision) that was beyond control of the bidders should not be proposed as a ‘listed risk’ (Kooiman 2007).

**Proposition 2c** Pricing risks is only useful for risks that both parties can equally assess, influence and bear.

4.2.3 **Coupling individual benefit to total benefit**

![Figure 12 Coupling individual benefit to total benefit](image)

Stimulate the reduction of the impact of risks by coupling individual benefit with total benefit

As explained in 1.2.2 the choice of reimbursement system is a search for the right incentive. When the reimbursement system is designed in the right way, parties are motivated to reduce all risks they bear. In 2.2.4 is explained that both parties strive for the largest individual benefit, because that is what they can win in the project. The individual benefit for the client is the difference between value and price, while the individual benefit of the contractor is the difference between price and costs. When premiums are used for risks that do not influence the individual benefit of that same party (for example a bonus for a contractor who delivers more value by reducing the impact of certain risks), the effect of the risk allocation can be improved. That means for such risks value has to be coupled to price (V→P) to motivate the contractor and price need to be coupled to costs to motivate the client (C→P).

For example when a contractor is responsible for minimising the hindrance for the traffic (the road users) during his works on the road, he will in the first
place not be motivated to manage the risk of increasing hindrance well. If he receives a premium to reduce that risk, let’s say a bonus for more availability of the road and a penalty for less, he is motivated to reduce those risks because the price is coupled to the value and thus his individual benefit again will be larger (see figure 13).

In 2.6.3 this is extended with the idea of the value/price-ratio.

Figure 13 Coupling value to price

It should be remembered that besides money, motivation can also be derived from need to obtain work, the enhancement of credibility, reputation and efficiency in planning and innovation or social responsibility (2.2.4), although this is not included in the price.

**Proposition 3** Coupling individual benefit to total benefit (to stimulate the reduction of the impact of risks) leads to a more effective risk allocation.
4.3 Total process

As a whole, the process of risk allocation based on these propositions looks like the schedule in figure 14.

Find optimal position for the transition between client and contractor and make the division clear and strict

Allocate ‘transition risks’ on the basis of
1) ability to influence, bearing capacity, motivation to bear, competence to foresee and assess
2) lowest price (if other criteria give not an answer)

Stimulate the reduction of the impact of risks by coupling individual benefit with total benefit

Figure 14. Hypothesis process
Phase 2
5 Case study protocol

5.1 Case study theory

Yin (1994) shows in his book the following scheme for case study research (figure 15).

![Case study method (Yin 1994)](image)

Figure 15. Case study method (Yin 1994)

In phase 1 the development of theory is done. In this chapter the selection of the cases and the protocol for data collection will be discussed. In the following chapters of phase 2, the case studies and the cross-case analysis will be described. The last steps of this method, the development of the implications, will be taken in phase 3.

5.2 Propositions

Clear and strict division that minimises risks
- Using a clear and strict division of responsibilities leads to a more efficient risk allocation.
- Using an optimal division of responsibilities (i.e. one that does not create more risks than necessary) leads to a more effective risk allocation.
Allocating transition risks
- A dialogue on the transition risks leads to a more effective risk allocation.
- Allocating risks based on the allocation criteria (expertise and ability to influence, bearing capacity to sustain, motivation to bear, competence to foresee and assess) leads to a more effective risk allocation
- Pricing risks is only useful for risks that both parties can equally assess, influence and bear.

Translation of risk allocation into price
- Coupling individual benefit to total benefit (to stimulate the reduction of the impact of risks) leads to a more effective risk allocation.

All propositions discuss the effectiveness and efficiency of the risk allocation and allocation process. These are concepts that are hard to measure:

*Effectiveness*: risks are allocated to the right party.
This is measured by how the parties feel about this statement. It will be questioned to all informants. Besides, when available, evaluation reports also give a good view on this point and give a relatively objective opinion.

*Efficiency*: time and resource inputs during the negotiation process yield value for money.
This can also only be based on the opinion of the informants. Here it is taken into account how much effort – and discussion – the allocation of a specific risk has taken.

5.3 Selection of cases

To make a good comparison of the cases they differ and correspond on several aspects.

Correspondence:
- *An integrated contract is used (all comparable with Design & Construct contracts)*
- *Client is Rijkswaterstaat (except for one project)*
- *The realisation phase is in progress*

Difference:
- *The approach to deal with risks and risk allocation*
- The reimbursement system
- The sector (dry or wet infrastructure)

The italic aspects are the ones that are used to select the cases.
A quick scan with some experts resulted with the following projects:
- A2 Hooggelegen
- Spoedanpak Amsterdam – ’t Gooi
- Amsterdam-Rijnkanaal
- Maasvlakte II (which is not a Rijkswaterstaat-project)

The following context variables were found relevant in this research. Some are fully taken into account in the analysis that is done in the cases, others are only discussed when the variation between the cases is significant and a few are not taken into account at all, which is discussed below.

<table>
<thead>
<tr>
<th>Context Variable</th>
<th>Taken into account in the analysis</th>
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<tbody>
<tr>
<td>Singularity of the project</td>
<td>Taken into account in the analysis</td>
</tr>
<tr>
<td>Solution space of the project</td>
<td>Taken into account in the analysis</td>
</tr>
<tr>
<td>Margin in time and budget</td>
<td>Taken into account in the analysis</td>
</tr>
<tr>
<td>Technical complexity</td>
<td>Taken into account in the analysis</td>
</tr>
<tr>
<td>Complexity in interfaces</td>
<td>Taken into account in the analysis</td>
</tr>
<tr>
<td>Uncertainty about project at the start</td>
<td>Taken into account in the analysis</td>
</tr>
<tr>
<td>Form of contract</td>
<td>Taken into account in the analysis</td>
</tr>
<tr>
<td>Size of the project</td>
<td>It is expected that there are only small variations on this variable and it is taken into account on the parts where variations seem significantly.</td>
</tr>
<tr>
<td>Degree of risk-thinking</td>
<td>It is expected that there are only small variations on this variable and it is taken into account on the parts where variations seem significantly.</td>
</tr>
<tr>
<td>Competence of the parties</td>
<td>It is expected that there are only small variations on this variable and it is taken into account on the parts where variations seem significantly.</td>
</tr>
<tr>
<td>Project organisation</td>
<td>It is expected that there are only small variations on this variable and it is taken into account on the parts where variations seem significantly.</td>
</tr>
<tr>
<td>Risk profile</td>
<td>It is expected that there are only small variations on this variable and it is taken into account on the parts where variations seem significantly.</td>
</tr>
<tr>
<td>Type of actors</td>
<td>This differs hardly over the projects as the same (type of) actors act in the cases. The difference in client between some projects is taken into account.</td>
</tr>
<tr>
<td>The culture of the project organisation (of both parties) and the companies behind them</td>
<td>Culture is very difficult to define and to measure and is therefore not taken into account in the analysis.</td>
</tr>
</tbody>
</table>
In the projects the sector differs between road infrastructure, dredging and land reclamation. The largest differences are in technical complexity and type of client, which are already mentioned. Therefore another ‘umbrella variable’ does not seem relevant.

### 5.4 Data collection

For case studies five levels of questions can be recognised (Yin 1994):
- Level 1: questions asked of specific interviewees
- Level 2: questions asked of the individual case
- Level 3: questions asked of the findings across multiple cases
- Level 4: questions asked of an entire study
- Level 5: normative questions about policy recommendations and conclusions

The questions on these levels for this research are explained here together with the sources to answer them.

#### 5.4.1 Level 1

**Questions asked of specific interviewees**

An interview protocol can be found in appendix B.
- How are the process of risk allocation and the result of the cases? (research question 3.1)

**Sources**

Respondents:
- Contract manager client/contractor of the projects
- Project manager client/contractor of the projects
- …

**Results**

Transcripts of the interviews can be found in appendix C.

#### 5.4.2 Level 2

**Questions asked of the individual case**

- How is this project related to the propositions? (research questions 3.2)
- How can the results of the project be explained?
- Are the differences between the interviewees explainable?
- …
Sources
Results:
- Interviews (level 1)
Documents:
- Evaluation reports
- Contract documents
- …

Results
Chapter 6 - 9 and the analysis in appendix D.

5.4.3 Level 3

Questions of the findings across multiple cases
- Are there any conclusions of the individual case studies that enforce each other?
- Are there any conclusions of the individual case studies that are contradictory?
- How can this be explained?
- Is the influence of the context variables relevant here?
- …

Sources
Results:
- Answers of the level 2 questions of case A
- Answers of the level 2 questions of case B
- Etc.

Results
Section 10.2

5.4.4 Level 4

Questions asked of an entire study
- How can the relation between propositions and important context variables be described?
- What can be concluded about the propositions? (research question 3.3)
- What other mechanisms do the cases show relevant for risk allocation? (research question 4)

Sources
Results:
- Conclusions level 3 questions
- Theory of phase 1
Results
Section 10.2 and 10.3

5.4.5 Level 5

Normative questions about policy recommendations and conclusions
- How can the information about the propositions and other mechanisms (result level 4) be used to do a proposal for improvement of effective and efficient risk allocation? (research question 5)

Sources
Results:
- Conclusions level 4 questions
- General conclusions about risk allocation

Results
Chapter 11

5.5 Quality

The book of Yin (1994) describes four tests which one has to deal when doing case study research. These are construct validity, internal validity, external validity and reliability. What they are and how is dealt with these points during this research is described below.

5.5.1 Construct validity

The idea of construct validity is the question whether the means are a valid form of measuring the ‘construct’. In this case the construct is the total of the propositions. This means the things to measure are effectiveness and efficiency. How these are measured is explained above.

To secure that these measures are as objective as possible, the following ‘tactics’ will be used:
- Multiple sources of evidence: not only different people with different viewpoints (client and contractor) will be interviewed, but also documents will be used as a source.
- Review by informants: the interviewees will review the transcription of their interview.
- Chain of evidence: the report will be written in such a way that one can trace back from conclusions towards the data collection. This has to be checked afterwards.
5.5.2 **Internal validity**

Internal validity is about whether the established causal relation really is a causal relation and not a spurious relation. In other words: does the ‘cause’ really leads to the ‘effect’?

Internally valid causal inference requires three conditions (Kenny 1979):
- temporal precedence (the cause precedes the effect in time),
- correlation (cause and effect are related),
- and nonspuriousness (there is no alternative explanation for the effect).

Especially the last one is important to keep in mind, as rival explanations can easily be overlooked.

Internal validity is dealt with as follows:
- Check with context variables: with the expert interviews a lot of context variables are found. In the cases a check has to be made whether these variables could be of any influence of the assumed causal inference.
- Timelines and reconstruction of processes: for each case a clear timeline has to be made that describes the full allocation process as it has evolved. Also for each case a reconstruction of a process is made to see the development of such process and its sequence.

5.5.3 **External validity**

When the results of a case study are generalisable beyond the case study itself, one can speak of external validity. This is important when one wants to use the results of a case study for policy implications.

In this research external validity is secured by two aspects:
- Multiple case study: by using multiple cases one can check whether the results confirm or contradict each other. When results are confirmed, external validity is reinforced.
- The independent variables (steps in the allocations process) are not influenced by other variables as they are explicitly ‘chosen’ by the client. This means that when the internal validity is secured, the results can more easily be generalised as there are no other variables at influence. Therefore they can well be generalised towards projects that fall within the boundaries of the research.

5.5.4 **Reliability**

The objective of testing reliability is to be sure that another investigator following the same procedures and using the same data as for this research will arrive at the same findings and conclusions. In this way one minimises the errors and biases in the study.

To be sure replication is possible, the following is done:
- Case study and interview protocol: in this chapter the protocol of the research is described.
- Checks: regularly the results will be checked with the respondents and external people.
6 Case A: Spoedaanpak Amsterdam – ’t Gooi

6.1 Introduction

6.1.1 Description project

To reduce the congestion on the Dutch roads, especially in the Randstad, a law was passed to accelerate the realisation of road projects by simplifying some public procedures. This enabled Rijkswaterstaat to take some small measures to enlarge highway capacity in short time. The minister wanted to start 30 projects and finish 10 projects within his cabinet term (before May 2011). Because the low tender capacity of the market – partly due to more work being tendered at the same time – the transaction costs and lead time of the tender phase should be minimal. Besides, to resolve the congestion on the highways as soon as possible, the tender processes were done parallel to the planning procedures.

This led to a special approach for tendering and contracting (based on the ideas of best value procurement) some of these road projects. Of the 30 projects, 16 were quite simple works (asphalting, renovation, adding lanes) that fell under this special approach. These ‘fast-track’ projects were divided in six clusters, of which A1/A6 Amsterdam – ’t Gooi (cluster D, in short: SAGO) was one. It is a (cluster of) project(s) of 190 – 250 million euro.

6.1.2 Sources

Interviewees

<table>
<thead>
<tr>
<th>Client: Rijkswaterstaat</th>
<th>Contractor: VolkerInfra</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rudie van der Wal</td>
<td>Dick Stoop</td>
</tr>
<tr>
<td>Wiebe Witteveen</td>
<td>Hans Kitslaar</td>
</tr>
<tr>
<td>Contract manager</td>
<td>Project director</td>
</tr>
<tr>
<td>Central ‘core group’ fast-track projects</td>
<td>Tender manager</td>
</tr>
</tbody>
</table>

See appendix C for the transcripts of the interviews.

Documents

- Reading guide contract
6.2 General information project

6.2.1 Timeline

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2008</td>
<td>Ambition RWS to realise the fast-track approach</td>
</tr>
<tr>
<td>Fall 2008</td>
<td>Start dialogue general fast-track approach with market parties</td>
</tr>
<tr>
<td></td>
<td>Involvement Wiebe Witteveen</td>
</tr>
<tr>
<td>March/April 2009</td>
<td>Discontinuance former project team A1/A6 (Rudie vd Wal already involved)</td>
</tr>
<tr>
<td></td>
<td>Start as ‘fast-track’-project</td>
</tr>
<tr>
<td>April/May 2009</td>
<td>Market consultation</td>
</tr>
<tr>
<td>July 2009</td>
<td>Start tender phase</td>
</tr>
<tr>
<td></td>
<td>Involvement Hans Kitslaar</td>
</tr>
<tr>
<td>Mid-November 2009</td>
<td>Involvement Dick Stoop</td>
</tr>
<tr>
<td>November 2009</td>
<td>Award (end tender phase)</td>
</tr>
<tr>
<td>April 2011</td>
<td>Planned end realisation phase</td>
</tr>
<tr>
<td>May 2011</td>
<td>Target date for realisation of 10 projects</td>
</tr>
</tbody>
</table>

6.2.2 Course project

The project was tendered in a non-public tender procedure and this tender procedure was aimed at finding the ‘expert’ that can help the client realise the project. In the tender bidders are asked for a risk file, an opportunity file, a planning and interviews with key persons (instead of complete plans, as usual). In the risk file one had to focus on the client’s risks. The contractor could propose measures to reduce these risks and pay the costs of these measures from a risk fund. This fund is also used to pay for the consequences in case a ‘client risk’ event would occur. What is left of this fund (owned by the client) is shared with the contractor.

One of the most important differences with a standard D&C contract is the fact that not design and execution are transferred to the contractor in one assignment, but that first the assignment for (part of) the design is given and later the assignment for (part of) the execution. This is done to be able to deal with the risk of the planning procedures that are still running.

To reduce time and transaction costs in the tender phase Rijkswaterstaat has chosen to work with a bill of quantities from a reference design of Rijkswaterstaat which had to be priced. Based on those prices the work is awarded. Later in the process, when the final design is made, the total budget is determined from the final quantities and the unit prices from the bid. The budget is adapted if the quantities differed more than (+/-) 5% from the reference design. If the contractor could stay within that range of 5% he would receive a bonus.

Time pressure is high in this project due to the strong urge to finish before May 2011.
6.2.3 Form of contract

Integration of contract
Design & Construct with half a year maintenance.
(Not based on the standard contract and with the use of some aspects of the UAV-gc)

Reimbursement system
Fixed price except the parts that were taken into account in the bill of quantities (5% arrangement).

Bonus/penalty on:
- End date
- Traffic hindrance

Bonus on:
- Reducing ‘client risks’
- Staying within 5% difference with original bid

6.2.4 Risk allocation

Use of risk analysis
Unknown

Allocation process
1. One-sided allocation by the client and no reallocation
2. One-sided allocation by the client with reallocation
3. Two-sided allocation process

Division of responsibilities and risks
The division of risks resulted from the division of responsibilities, except for the following aspects:
- The client is responsible for the list of quantities, but the first 5% of mistakes in them (the risk around the quantities) is allocated to the contractor. Above 5% is allocated to the client.
- The ‘client risks’ are risks resulting from responsibilities of the client and that are allocated to the client, but that need to be managed (also) by the contractor.
In the division of risks the project team used four categories:
- contractor risks: all risk that fall within the responsibility of the contractor
- unforeseen external risks (such as changes of scope and external interface risks): all risk that fall within the responsibility of the client
- risks in the risk fund (‘client risks’): responsibility and risk of the client, but the contractor is motivated to reduce these risks as much as possible
- pricing risk: the consequences of mistakes, uncertainties and contradictions in quantities (provided by the client) that were used for the pricing; the first 5% is risk for the contractor, the rest for the client.

**Unidentified risks**
Unknown

### 6.3 Analysis

#### 6.3.1 Analysis of propositions

Per case a few issues are analysed to research the propositions. In appendix D this analysis can be found. An explanation of the issue and the most striking details are discussed in this section.

**Quantities of asphalt**

The quantities of porous asphalt on the provided drawings differed from information somewhere else in the contract (where other locations where this asphalt was needed were described). So, these locations did not correspond with the quantities and the drawings on which the pricing was based, which led to a difference of 30% or 1.5 million euros. This turned out to be a debit for the contractor.

Remarkable here is the fact that risk and responsibility are allocated differently: the client is responsible for the framework (specifications and information), while the contractor had to bear the consequences. The client wanted to deal with time pressure in this way: now they did not need a lot of time to work
out the details, but the contractor would still be motivated to reduce quantities. In principle this idea sounds logical, but in this specific case the contractor could not influence the risk. Where porous asphalt needed to be used is purely a requirement and therefore part of the framework, which is the responsibility of the client.

Pipes and cables
Some pipes and cables had to be relocated by the contractor in a lead time that was unrealistic. Besides, the fact that some pipes and cables were the responsibility of the contractor was overlooked by the contractor in the tender phase.

This is a complex situation, because on the one hand the contractor failed to filter all necessary information out of the provided documents and on the other the client provided a large pile of information of which he thinks himself that it could be done better. On top of that there was this problem with pipes and cables that could not be relocated in time, which was only noticed after the tender phase. This was a mistake by the client.

Interface Muiderbrug
Another project (Muiderbrug; another client and another contractor) falls within the working field of this project and has major interfaces with the SAGO-project in terms of planning, techniques and traffic flow. The SAGO-contractor has an ‘obligation to coordinate’ with the other contractor to make sure the end date of the SAGO is not in danger. This worked out very well.

In this case it is clear that the contractor had a large motivation to manage this risk. If the project would finish in time, he would receive a large bonus. Besides this motivation, he also had the means to deal with this risk: he had the responsibility to have this contact with the Muiderbrug-contractor and with the prospect of receiving a large bonus for finishing in time, he could use some of that bonus to motivate the other contractor.

6.3.2 General remarks
The bonus systems in this project worked very well to motivate the contractor. Also the idea of motivating the contractor to manage the client’s risk turned out to be a success in this project.

The time pressure on this project has had a large influence and one has to take care that this is not harm the quality of the work, especially that of the client because it brings large risks.

Remarkable is the fact that the client thought he needed a more nuanced way to deal with risk allocation than the ‘listed risk’ approach.
6.3.3 Reconstruction process pipes and cables

This project has a long history, which means a lot of things were already sorted out by the client’s organisation. Some pipes and cables were already relocated by the client and some of the relocations were arranged with the cable owners. All work that still had to be done was transferred to the contractor.

The contractor had the idea he was flooded with information during the tender phase. With that information there were documents about pipes and cables which showed what was already arranged and not. On that moment he did not see the line in those documents, stating that all pipes and cables had to be arranged by the contractor. He was in the belief that things were arranged and he did not have to take into account any pipes and cables.

Only after the award of the contract, the contractor found out that the pipes and cables were also his responsibility. This meant he needed to find out quickly how to do that. It turned out that some of these relocations that had to be done were not reasonable within certain deadlines the client had prescribed. Now he could not stick to the agreement. The contractor was surprised about these requirements, as he thought the client would also have known that this was impossible.

The unreasonable requirements were taken back and the client had to bear the consequences. Both parties think this was the best solution.

Looking back, the client thinks the provided information in the tender phase could maybe be clearer and more compressed. That could have helped to reduce this issue.
7  Case B: A2 Hooggelegen

7.1  Introduction

7.1.1  Description project

A2 Hooggelegen is part of the project A2 Holendrecht-Oudenrijn, which is aimed at reducing the traffic congestion on this corridor. The scope of the project is widening the road to 2x5 lanes between Leidsche Rijn Tunnel (under construction) and the Oudenrijn junction. Besides that, all kinds of small works around that part of the highway are taken into the scope.

A2 Hooggelegen is executed as a pilot for alliance contracting. After the award of the contract, client and contractor join in an alliance to realise the project. The size of the project is between 110 – 140 million euro.

7.1.2  Sources

Interviewees

<table>
<thead>
<tr>
<th>Client: Rijkswaterstaat</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Marco de Regt</td>
<td>Contract advisor alliance</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contractor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trajectum Novum</td>
</tr>
<tr>
<td>Eddy van Haastregt</td>
</tr>
</tbody>
</table>

See appendix C for the transcripts of the interviews.

Documents
- Evaluation report contracting phase
- Project management plan

7.2  General information project

7.2.1  Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>CAU-decision (Corridor Amsterdam – Utrecht)</td>
</tr>
<tr>
<td></td>
<td>Plan study</td>
</tr>
<tr>
<td>1997</td>
<td>Involvement Marco de Regt</td>
</tr>
<tr>
<td>2004</td>
<td>Decision for alliance contract</td>
</tr>
<tr>
<td>November</td>
<td>Information meeting</td>
</tr>
<tr>
<td>2006</td>
<td>Governance agreement A2 Hooggelegen</td>
</tr>
<tr>
<td>2007</td>
<td>Prequalification</td>
</tr>
<tr>
<td>February</td>
<td>Dialogue phase I (two rounds)</td>
</tr>
<tr>
<td>March – May 2007</td>
<td></td>
</tr>
</tbody>
</table>
A2 Hooggelegen is a project with a long history. Already in 1997 one was working on the plan study. In the course of the time, the idea came to tender the project as an alliance contract. This was based on the idea of Rijkswaterstaat to develop a new approach of the market. A2 Hooggelegen was a pilot project for this approach. Firstly one wanted to form an independent company for this alliance, but this turned out to be very difficult for governmental organisations. Therefore an organisation was made of people from both parties, besides the client and contractor organisations.

The tender was a competitive dialogue procedure in which the pricing of the work was done based on a reference design. This design was the design that was already finished in 2000 when one was aiming at tendering the project with complete specifications (‘traditional’).

The goal is to finish the project in 2010, just like all A2 motorway projects.

### Form of contract

#### Integration of contract

Because of the use of an alliance this is hardly comparable with standard forms of contract. In general the client transfers more or less the same work as with a Design & Construct contract, but in this case he also delivers people for the alliance. So, the design and management of the project is shared by the client and the contractor. The execution is transferred to the contractor. There is no maintenance in the contract.

**Reimbursement system**

The awarded bid is a target price. If the final price differs from the target price, the difference will be shared by the parties (as it is a budget for the alliance).

Bonus/penalty on:
- Traffic hindrance
- Traffic safety
- Time
- Quality
- Image
- Budget
7.2.4 Risk allocation

Use of risk analysis
In the preparation of the contract several risk analysis are done about project and contracting aspects.

Allocation process
1. One-sided allocation by the client and no reallocation
2. One-sided allocation by the client with reallocation
3. Two-sided allocation process
There are different signs here. The contractor had the idea there was no room to adjust things in terms of risk allocation. At first there would be a negotiation round in which pricing of risks would be used, but that topic was removed from the agenda.

At the other hand, according to the client, the bidders were able to choose whether or not they wanted to share costs in case of rising above the budget ceiling and the bidders could decide themselves how the division of responsibilities (which has effect on the risk allocation) between the alliance and the building contractor would be arranged.

Division of responsibilities and risks
The division of responsibilities was unclear on the point between the alliance and the building contractor. This was not laid down beforehand and remained unclear for a long time.

The division of risks is the same as the division of responsibilities (see below) with the following connotations:
- The risk around the framework (mistakes etc. of the specifications and information) lies with the alliance but is capped. The client is responsible for this framework.
- Price fluctuations are allocated with the alliance. No party is responsible for these fluctuations.
The division of risks is the following:
- Client risks: such as changes of scope, unexploded explosive ordnance (UXO), but also Acts of God.
- Alliance risks*: design risks and other risks that fall within responsibility, but also price fluctuations and errors or contradictions in specifications and information provided by the client (until cap).
- (Building) contractor risks: execution risks.
What can be seen that it is often unclear what exactly an execution risk and what a design risk implies.

Unidentified risks
Unidentified risks are allocated on the basis of the cause of occurrence. There still remains possibility to discuss about the cause.

7.3 Analysis

7.3.1 Analysis of propositions

Per case a few issues are analysed to research the propositions. In appendix D this analysis can be found. An explanation of the issue and the most striking details are discussed in this section.

Pumping station
An existing pumping station seemed to fit under the new designed cross-over (in the reference design). In practice it turned out this information was inaccurate and the pumping station had to be relocated. This was not taken into account as the bid was based on the reference design. The client had to pay for the extra costs.

In fact this problem was dealt with in the right way. The contract stated that the client was responsible for the correctness of the information and when it turned out that some of the information was incorrect, the client paid for the consequences. Nevertheless, additions to the contract are in general always more expensive than prices made in competition. The client would help himself by delivering good work.

Portals
By providing a lot of documents with (partly) the same information inconsistencies arose. There was different information available about the interface with the tunnel contractor. The pricing during the tender was based on a drawing that showed portals that had to be delivered by the tunnel contractor, while in interface drawings (also part of the contract) it turned out that the alliance had to deliver those portals. This resulted in a deficit of one million euros. First was decided to have this risk borne by the alliance, but now again discussion has started about it.
This was again a problem with the correctness of the information, but now discussion was possible because as well the correct information as the incorrect information was provided (inconsistency). This is an issue that led to a lot of debate and is extensively discussed below.

**Decontamination**

In the provided information researches to soil contamination were included. According to the contractor, in the piles of information a summary was hidden, which was not recognisable as such and which referred to documents that were not included. This summary was overlooked during the tender and this resulted in a wrong estimation of the costs for decontamination. The resulting costs are borne by the alliance.

In this case both parties made mistakes: the client provided information in a careless way and the contractor did not use all available information. They share the extra costs.

The way incentives work in this case is in fact remarkable:

There is no incentive for the client to deliver good work on this point. Now it turns out he bears part of the consequences, but this was no motivation at the beginning of the project. For the contractor there is a strange incentive: if he sees the information about the contamination and he finds out it is incomplete he can either take it into account (with the possibility of losing the tender when other parties did not take it into account) or not (with the possibility to show later that the information was incomplete and share it in the alliance).

**Maintenance bridge**

For the maintenance of a bridge (part of the project) the weather normally is a realisation risk. In this case, it was necessary that the whole bridge would be packed into some sort of foil. That created a new risk: when high winds would occur, the bridge could become unstable. That means the bridge needed to be – partly – unpacked and later again packed, which would lead to delays. If this is fully a realisation risk, the contractor would look for other approaches, which would probably be more expensive for the client. Now this risk (for delays in case of high winds) was shared and so the costs are reduced by choosing the ‘foil variant’.

This case shows that the alliance idea of joint decision-making helps to optimise during the project. Both parties, but mostly the contractor, feel more confident when it is clear both parties agree with the decision.

7.3.2 **General remarks**

The alliance has some clear advantages. Especially the fact that with making decisions both parties are involved helps the parties to optimise. As said in one of the expert interviews: the largest risk for a contractor is the uncertainty around the client on how he will read the contract later in the process. But by
making decisions together, as well the contractor as the client knows they both agree with the decision. Now both parties strive for the best for the project or for enlarging total benefit instead of for enlarging individual benefit. Nevertheless, for such a ‘cooperative’ approach it is strange that there is not much cooperation in the risk allocation process.

The client chose to use a reference design in order to reduce transaction costs in the tender phase. The evaluation report states that the bidders had problems with the quality of the reference design given by the client. That reference design was made to reduce the amount of work that has to be done by the bidders during the tender phase. According to the bidders, they had to invest a lot of time in figuring out what is correct and what not. They state that the reference design created more work than it saved. Besides, one can see that mistakes in that design led to higher cost during the tender. It seems that one did not realise this trade-off fully beforehand.

In the evaluation report it becomes clear the client had expected more creative, alternative ideas from the bidders. He was disappointed on that point. The bidders state they did not have the solution space as they were tied on time, reference design and a budget ceiling. The perception of solution space is thus different!

Another remark has to be made about the pricing of risks. The client explicitly chose not to use the system of ‘listed risks’, because it would be difficult to price the risks and would take too much time during the tender phase. Apparently this approach does not outweigh its complexity and disadvantages.

7.3.3 Reconstruction process portals

The preparation of the tender suffered of large time pressure. Parts of the information made in the preceding years were collected and used as information for the tender. There was hardly time for the client to structure this information.

A reference design provided by the client was used in order to reduce transaction costs and time in the tender phase. During the tender the bidders were asked to do a bid, which would form the budget for the alliance, based on this reference design. In the tender documents was also stated that the client was responsible for the correctness of the provided information.

The contractor tried to manage all the information he could use for his bid. At the start of the tender drawings were available that needed to be used for the pricing, but also during the tender new information was provided to the bidders. This led to a large and complex flow of information that needed to be dealt with by the bidders.
There was different – contradictory – information available about the interface with the tunnel contractor. The pricing during the tender was based on the reference design, which consisted a drawing that showed portals that had to be delivered by the tunnel contractor and that was provided at the start of the tender phase. Interface drawings on the other hand showed that the alliance had to deliver those portals. Those drawings were provided during the tender phase. During the tender phase this difference was not noticed by the bidders and no questions were asked about it.

After the tender phase the difference was remarked and the issue was discussed between the parties. It turned out to be a deficit of almost one million euros. The contractor thought the information was unclear while the client argued that the contractor could have notice the difference and come to a solution. The parties agreed to add the extra costs for the portals in the alliance budget (so they shared the costs), but now again discussion has started about it.
8 Case C: Dredging Amsterdam-Rijnkanaal

8.1 Introduction

8.1.1 Description project

The project Dredging Amsterdam-Rijnkanaal (ARK) is aimed at maintaining a certain depth of the canal. The ARK is a busy canal, which is used by a large amount of professional shipping. The dredging is done at 28 sections of the canal, between Amsterdam and Tiel, and on two small sections on other canals (Lekkanaal and Merwedekanaal). Important issues in this project are the traffic hindrance during the dredging, the impact on flora and fauna and the handling of potential explosives from World War II. Besides, little was known about the current status of the canal. The size of the project was between 17 – 18 million euro.

8.1.2 Sources

Interviewees

<table>
<thead>
<tr>
<th>Client: Rijkswaterstaat</th>
<th>Contractor: Boskalis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frank van der Hell</td>
<td>Thijs Woolderink</td>
</tr>
<tr>
<td>Jeanis Lam</td>
<td></td>
</tr>
<tr>
<td>Contract manager</td>
<td>Project manager</td>
</tr>
</tbody>
</table>

See appendix C for the transcripts of the interviews.

Documents
- MEAT-criteria

8.2 General information project

8.2.1 Timeline

<table>
<thead>
<tr>
<th>End 2007</th>
<th>Procurement sessions involving Jeanis Lam</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2008</td>
<td>Contract award Involvement Frank vd Hell</td>
</tr>
<tr>
<td>July 2008</td>
<td>Start investigation sediment (except UXO sections)</td>
</tr>
<tr>
<td>October 2008</td>
<td>Involvement Thijs Woolderink</td>
</tr>
<tr>
<td>January 2009</td>
<td>Start dredging activities</td>
</tr>
</tbody>
</table>
Before putting the project in the market time and energy was invested in deciding on the risk allocation. There were a lot of uncertainties: whether and to what extent the spoil was polluted, what the contractor intends to do with the spoil, how much spoil needed to be dredged as this information was based on very old sounding data, what the current profiles of the canal were and how the market would react on the “market, unless…”-approach of Rijkswaterstaat. In this preparation one tried to stick to an abstract level which led to functional specifications for the project. The uncertainty about the quantities and quality of the spoil was taken into account by having the bidders to price different categories of quantity and quality, to be able to determine the price later on.

**8.2.3 Form of contract**

**Integration of contract**
Engineering & Construct (based on UAV)

**Reimbursement system**
Fixed price except the pricing of the spoil, which was done with unit prices. No bonuses, only penalties for not meeting the obligations.

**8.2.4 Risk allocation**

**Use of risk analysis**
A risk analysis was the basis for the decision how risks and responsibilities would be allocated.

**Allocation process**
1. One-sided allocation by the client and no reallocation
2. One-sided allocation by the client with reallocation
3. Two-sided allocation process
But there have been no changes during the tender procedure.

**Division of responsibilities and risks**
The division of risks is similar to the division of responsibilities. During the project the responsibility of UXO and public communication were transferred to the contractor. The consequences when UXO was found remained with the client.
Unidentified risks
There were risks in which the contract did not foresee. When such risks occurred the parties tried to jointly decide who should bear the consequences. This can be based on the UAV conditions or on a sense of reasonableness. It is also possible to insure risks. The client has put aside some money for such unforeseen costs.

8.3 Analysis

8.3.1 Analysis of propositions
Per case a few issues are analysed to research the propositions. In appendix D this analysis can be found. An explanation of the issue and the most striking details are discussed in this section.

Classification method of the spoil
Delivering spoil (dredged from the canal) at depots yields money. This spoil is in fact property of the client. Because it was unclear how much had to be dredged at the start of the project, the client asked for unit prices per class of spoil, in order to pay for this part of the project by 'cost plus'. One of the depots has its own specific criteria for acceptation (and resulting price). The contractor interpreted the classification written down by the client differently than was meant by the client. This has led to large discussions. In the end both parties moderated their demands.

Two things are important here. Firstly the fact that a less strict division (instead of everything around quantity and quality of the spoil with the client/contractor) might be less efficient (more discussions), but can sometimes lead to a more optimal division.

Secondly, it can easily happen that parties have different ideas – perceptions – about how things are arranged in the contract.
Permits
The client has helped the contractor in the process of permits. Some legislation was changed, but the authorities did not accept this yet. On that point the client joined the contractor in this discussion, which led to a good solution. This was a flexible solution for a difficult situation.

The division of responsibilities was in this case strict – and remained contractually strict –, but because it did not work out optimally the client started to help the contractor. This shows that sometimes a less strict division – in the way of working – can lead to a more optimal organisation.

Unexploded explosive ordnance (UXO)
The client had the responsibility to deal with UXO, but could only do that by not reaching the project objectives in terms of scope (not dredging certain parts) or spend a lot of money (having all suspected objects removed by divers). The most optimal solution was one in which the contractor had to deal with the UXO (by manoeuvring around the suspected locations), except for the situation in which something (a bomb) was found. This work (for the contractor) was added to the contract.

Important in this case is the fact that there was a lot of uncertainty about the UXO during the tender phase. This means it was unwise to allocate UXO directly with the contractor, because he would price the risk very high due to the uncertainties. The fact that one was flexible enough to relocate certain responsibilities later in the project makes optimisation possible.

Public communication
The contractor developed a project website with information about the work to communicate to the users of the canal. The fact that the contractor did the communication towards the end users of the canal is remarkable, because the policy of Rijkswaterstaat states that public communication always stays with Rijkswaterstaat (and was in the first place responsibility of the client). Therefore the website had to be removed directly after the work was finished.

In this case it becomes clear that finding and using an optimal division of responsibilities is not always that easy. Both parties agreed that public communication could best be done by the contractor, but they were restricted by the policy of the client’s organisation. In the end it worked out, but not in a very efficient way.

8.3.2 General remarks
After the award one organised a Project Start-Up (PSU). In this PSU also the management of both organisations were involved. The parties agreed to make
the project a success and dedicate their selves to good cooperation. This approach did often help to ease discussions and come to cooperative solutions.

8.3.3 Reconstruction process public communication

In line with the policy of Rijkswaterstaat public communication was allocated to the client and as such written down in the contract. The contractor proposed to make a project website to be able to have actual traffic information available for the users of the canal, because the client’s organisation was not able to have the information always up-to-date. The parties agreed that this would be a better solution and they tried to find some freedom in the contract. In dialogue they looked for the borders of the definition of ‘public communication’ and also let the contractor do some work on behalf of the client. The parties really tried to arrange the situation best as possible.
9 Case D: Maasvlakte 2

9.1 Introduction

9.1.1 Description project

Maasvlakte 2 is part of the Rotterdam Mainport Development Project (PMR), which has the goal of creating space in both the port and the region, for both business and nature.

Directly to the west of the current port and industrial area, a new location for port activities and industry is to be created in the North Sea.

The reclaimed land will emerge after the construction of a combination of hard and soft sea defences in the North Sea. Inside these defences, the sites will subsequently be sprayed on. The sand for this will come from locations at sea, but will also become available when the port itself is deepened. The land reclamation will measure around 2000 hectares in total.

(Based on information of www.maasvlakte2.com)

The size of the project was well over 1 billion euro.

9.1.2 Sources

Interviewees

<table>
<thead>
<tr>
<th>Client: Port of Rotterdam Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan Ochtman</td>
</tr>
<tr>
<td>Tender manager</td>
</tr>
<tr>
<td>Contractor: PUMA</td>
</tr>
<tr>
<td>Peter van der Linde</td>
</tr>
<tr>
<td>Member Board of Directors</td>
</tr>
</tbody>
</table>

See appendix C for the transcripts of the interviews.

Documents

- Contract
- BAFO Guide (BAFO = Best And Final Offer)

9.2 General information project

9.2.1 Timeline

<table>
<thead>
<tr>
<th>Early 2005</th>
<th>Start tender preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2005</td>
<td>Invitation to pre-qualify</td>
</tr>
<tr>
<td>January 2006 - June 2007</td>
<td>Initial negotiations with 2 bidders</td>
</tr>
</tbody>
</table>
9.2.2 Course project

The tender phase was organised as a negotiating procedure (very similar to the Competitive Dialogue). The client had to deal with a lot of procedures to take away environmental concerns, which has had large impact on the project. During the tender the following aspects were negotiated (in this order): (technical) scope, planning, division of responsibilities and price. The initial division of responsibilities was made by making an explicit analysis. The trade-off was between what is reasonable to ask from the contractor (what is common work for him) and what cannot be borne by him? The division is strict: the contractor would never have to worry about the permits and vice versa. The adjustments in the allocation of risks (including caps) which are discussed during the negotiations are translated into the price and into the contract. During the realisation hardly any large risk events have occurred yet.

9.2.3 Form of contract

Integration of contract
Design, Construct and Maintain; a tailor-made contract, which was a combination of a D&C contract (but written with the DBFM philosophy) and a maintenance contract.

Reimbursement system
Fixed price, except for some small parts for which unit prices were taken into account (cost plus).
No bonuses, penalties if the contractor does not realise what was agreed upon.
Different prices were agreed upon for different durations of the project.

9.2.4 Risk allocation

Use of risk analysis
During the extensive analysis before the tender also risk analyses were done.

Allocation process
1. One-sided allocation by the client and no reallocation
2. One-sided allocation by the client with reallocation
3. Two-sided allocation process
Although pricing of risks was used it is still reallocation, because the client started with an initial allocation which would be the allocation if nothing would change.
**Division of responsibilities and risks**

The division of risk follows the division of responsibilities for the client, the contractor and the small alliance part, except for the following:

- The responsibility of the main permits is allocated to the client, but the risk is indirectly shared with the contractor (see section 9.3.1 for explanation).
- A few risks are reallocated to the client, while the responsibility remains with the contractor. This was done to reduce the price of the project (also explained in 9.3.1)

**Unidentified risks**

The contract is so-called ‘closed’, which means everything should be arranged within the contract. Either risks are identified or process agreements are made how to deal with such risks.

### 9.3 Analysis

#### 9.3.1 Analysis of propositions

Per case a few issues are analysed to research the propositions. In appendix D this analysis can be found. An explanation of the issue and the most striking details are discussed in this section.

**Delay main permits**

In the contract the right to postpone the start of the work by the client was included. This was incorporated because of the possibility that parallel procedures for the five main permits delayed. This happened indeed and the client could now postpone the start of the work by only paying a compensation for the cost made until the delayed start.

The important thing of this example is the fact that risk was reduced by making the division between the parties less strict. Now both parties had to deal with
the impact of the delayed permit procedure. Things were arranged in such a way that the impact for both parties was much lower than when the client had to bear it himself.

Uncertainty permits
Because the permit procedures were not finished on the moment the contract was awarded, one did not know exactly what kind of requirements would result from these permits. This leads to high uncertainties, especially for pricing the work. Therefore ‘pro forma’ requirements were taken into the contract, with all kind of unit prices in order to be able to determine the exact price later on.

This is one of the few examples in which the client builds in an incentive for his own work. If the client would have the uncertainty around the requirements of the permits fully borne by the contractor (within a fixed price), he would have no incentive to use his influence on the permit procedures. Besides, he would probably pay a high price, because of the uncertainty for the contractor. Now, the client can do its best to limit the impact of the requirements of the permits and thus reduce the costs of the contractor. Because the price is coupled to the costs of the contractor, the client is also motivated by his individual benefit to do this.

Disagreement about price
After the best and final offer (BAFO) was done and it turned out the client did not agree with the bids, another negotiation round was introduced. In this round the pricing of some risks were discussed. The Port Authority did not agree with the pricing of certain risks. They thought the prices on these risks were too high. The contractor thought – and still thinks – these were the right estimations of the risks. Therefore the risks were transferred back to the client or taken into the contract in the form of a provisional sum.

This example shows clearly that different parties have different knowledge, different insight and different perceptions of a risk and therefore price risks differently. But, as seen before, if uncertainty about parts of the project is very high, it can be a solution to make those parts ‘cost plus’ in order to avoid pricing something very uncertain.

Alliancing hard seawall
The hard seawall was technically one of the most difficult parts of the project. The contractor had proposed to form an alliance with the client for the optimisation of the hard seawall. Everything that would be won by this alliance would be shared between the parties.

Very complex works are interesting for a contractor to deal with in an alliance. Now he gets some more possibilities to sort things out. Besides, both parties now strive for the same solution, while otherwise they would like to see a different solution (the contractor a slim design, the client a robust design).
9.3.2 General remarks

This project was different compared to the others in size and client. It was also very large and unique for the client’s organisation. Therefore a large amount of the people involved was external (hired). This resulted in an organisation of high quality.

Important to notice is also the fact that the contractor remarked that he thought it was difficult to speak openly during the negotiation phase. Although the client underlined that information would not be used or leaked, the contractor did not share everything during those dialogues.

9.3.3 Reconstruction process disagreement about price

The client explicitly chose to deal with the different aspects of the negotiations ((technical) scope, planning, division of responsibilities and price) in this specific order. The idea was to have a clear view of the total scope and responsibilities of the contractor, before he offers a bid. In that way there would be little vagueness about the content on which the pricing is based.

Nevertheless, after one year of negotiating – the total negotiation phase lasted two years – a preliminary, indicative bid was asked. By doing that the client could check whether the bids were still in budget.

After two years of negotiating the bidders did a final offer for the work as negotiated. Very soon it turned out the client was disappointed with these bids and that they did not fall within the available budget. The client wanted a new negotiation round.

The client was indeed disappointed, especially because the final bid differed significantly from the indicative bid. One got the idea that the bidders did a high bid, because they thought price was not that important for the client as it was discussed only at last in the negotiations. Looking back, it might have been better to start earlier with discussing the price.

In this extra negotiation round both parties were eager to come to a good deal. The client wanted the project to continue and contract a dredger and the contractor wanted to win the tender as there was still competition with another bidder.

During this extra negotiation round parts of the project – and specific risks in the project – were found where the parties disagreed about the pricing. The client thought that the estimates of the contractor were too high on these points. The contractor on the other hand was convinced about these estimates and did not want to adjust them. Finally the parties decided to adapt the risk allocation of these specific parts. These were the risk on:
- the maintenance of the seawall,
- the measures against spraying of sand,
- the cooling water outlet (of a factory) and
- the location of the sand extraction.
One decided to have these risks borne or capped by the client or made cost plus.

It is not yet clear what the results will be of these parts of the project. Both parties are still convinced by their own estimates.
10 Analysis and conclusions

10.1 Introduction

Generally, it was seen in the cases that risk allocation is often organised differently than proposed in the literature. The process of risk allocation is passed less explicitly and the tools for risk allocation handed by the theory – such as allocation criteria – are used less often than expected. The analysis of the case study and the resulting conclusions will be discussed here.

This chapter will answer the following research questions:
- What do cases show about these requisites (translated into propositions based on the requisites for effective and efficient risk allocation, dealing with the allocation process and the result of the project) and important context variables?
- What other mechanisms do the cases show relevant for risk allocation?

For each case three or four issues are described in the preceding chapters about the cases that are used to analyse the propositions. The scheme used for this analysis can be found in appendix D. Each column of this analysis scheme is discussed in section 10.2, and will lead to conclusions about each proposition and will answer the first research question.

Besides the findings in each column, there are also more general findings and findings that do not relate to the propositions. These are discussed in section 10.3 and will answer the second research question.

Section 10.3 will also discuss the relation to project objectives and the influence of the context variables.

Finally, in section 10.4 an overview is given of how everything relates to each other.

10.2 Analysis and conclusions about propositions

10.2.1 Using a clear and strict division of responsibilities leads to a more efficient risk allocation

Analysis relation
The cases show indeed that using a clear and strict division of responsibilities leads to a more efficient risk allocation. The interface Muiderbrug in the SAGO project shows the use of a clear and strict division of responsibilities and an efficient outcome. The division between the alliance and the building
contractor in the A2 Hooggelegen case shows that vagueness about the division of responsibilities leads to an unclear risk allocation, a lot of discussions and thus a less efficient risk allocation.

This vagueness is in a lot of cases caused by the fact that responsibilities are not made explicit. They are for example ‘hidden’ somewhere in the contract (as with the SAGO project), one assumes things are clear by just using standard conditions for very specific parts of the project (A2 Hooggelegen), the division of responsibilities is not yet fully decided upon (A2 Hooggelegen) or responsibilities are not mentioned at all (especially in case of client’s responsibilities). This lack of explicitness – a lack of communication – leaves room for individual perceptions of the contract: the parties think they know what their role and responsibility is. It is possible these perceptions do not fit in with each other and problems arise. Such problems only arise in a relatively late stadium of the project and will lead to discussions about the allocation. In that case the allocation is still not efficient. It should be mentioned here that there could be other reasons for this vagueness around the division than ‘just’ negligence or mistakes: one could think it is difficult to make it clearer, it could be disadvantageous to make it clearer, etc. These reasons are not sought in this research, but could be a topic for further research.

Nevertheless, discussions can have positive effects on the risk allocation, but this is discussed with the third proposition.

There are also cases that show the use of a less strict, but still clear, division of responsibilities. In those cases both parties deal with the same issue, such as the delay of main permits in the Maasvlakte 2 case or the UXO in the Amsterdam-Rijnkanaal case.

In the Maasvlakte 2 case the delay risk was too high for the client to bear that it was spread in a way both parties had to deal with the risk (a less strict division). This is discussed by the parties, which makes it less efficient, and they decided to add some arrangements in the contract which made possible delays workable for both parties. In this case there is a trade-off between an efficient process and an effective allocation.

Consequences for risk allocation
- Clarity about the division of responsibilities leads to efficient risk allocation: always make responsibilities explicit.
- In general, a strict division of responsibilities leads to efficient risk allocation. In cases of very large risks, a more effective risk allocation can be derived by having both parties deal with the risk. In such cases, one can better make division less strict in order to reduce the risk.
10.2.2 Using an optimal division of responsibilities (i.e. one that does not create more risks than necessary) leads to a more effective risk allocation.

Analysis relation
The cases show examples in which effort is made to make an optimal division of responsibilities. They show this effort can indeed reduce risks and lead to a more effective risk allocation. This is not always a strict division of responsibilities. The way one dealt with the delays of permits in the Maasvlakte 2 case shows that such effort – discussing how the arrangement on this topic should be – reduced the risk.

Also, almost all cases show that risks are allocated to the same party as the ‘corresponding’ responsibility. In the case where this is done otherwise, such as in the SAGO case about quantities of asphalt, it led to problems due to the fact that the bearing party cannot influence the risk. So, it is important to allocate risks in the same way as the responsibilities.

In the cases it often happens that policy or budgetary considerations reduce the search for an optimal division of responsibilities. Rijkswaterstaat does not want to transfer public communication to the market. In the projects A2 Hooggelegen and dredging Amsterdam-Rijnkanaal the project organisations thought this was not an optimal approach and searched for complex ways to transfer this responsibility within the rules of Rijkswaterstaat.

The Maasvlakte 2 case shows that budgetary reasons made the project organisation deviate from what they thought was an optimal division. And for Rijkswaterstaat there is the strong influence of the “Market, unless…” approach, which means sometimes more responsibility is transferred to the market than works well for the project. An example is the pipes and cables in the SAGO-project.

This development is enforced by the fact that contractors often ask for more responsibilities to be allocated to them, because of commercial reasons. (As a matter of fact, they only want that as long as they know clearly what is allocated to them, otherwise they cannot take it into account in their bid and they feel cheated.) Nevertheless, transferring more responsibilities to the contractor sounds interesting for the client, because it releases him from a lot of worries. But, the client should consider what to transfer, in order to have a division that is optimal for the project and for the client himself. This means some parts of the project can better be done by the client himself. This is especially the case for parts that are relevant from a public responsibility point of view.

Nevertheless, even when one looks for an optimal division of responsibilities, there is no guarantee for a project-lasting optimum. Several cases show that during the project more information becomes available and the parties find out that the optimum for the division of responsibilities, and with that an optimal risk allocation, has changed. In such situations it is important to be flexible and...
to reallocate the relevant responsibilities. The example of UXO in the Amsterdam-Rijnkanaal project shows this is not difficult and leads to a good result. To be able to deal with situations that ask for reallocation, it is helpful that both parties are continuously in dialogue and invest in a trustful relation.

Finally, there are several situations that show an optimal division of responsibilities, but where the client shifts back risks to himself by providing inconsistent or wrong information. By doing that the client (unwillingly and unknowingly) changes the risk allocation and makes it less optimal.

Consequences for risk allocation

- Risks, allocated differently than the corresponding responsibility, create problems: allocate risks according to the division of responsibilities.
- Policy and budgetary considerations can have negative influence on the division of responsibilities: clients have to pay more attention to project specific considerations to create an optimal division of responsibilities.
- A well-thought initial division of responsibilities is not enough for a continuously evolving project: arrange recurring dialogues to discuss the current division and make reallocation possible. This is mostly the case in projects with long lasting contracts and/or where specific information is not available at the start, for example due to running procedures or researches.
- By delivering work that lacks quality, clients create more risk than necessary. It is important that client’s organisations are critical on their own performance.

10.2.3 A dialogue on the transition risks leads to a more effective risk allocation.

In the cases can be seen that dialogues are not used purely for the allocation of transition risks, but also to discuss other aspects of risk allocation. This broad approach of dialogues is used in the analysis and the conclusions.

Analysis relation

The cases show no situation in which the parties together arrive at an initial allocation of risks. The Maasvlakte 2 project made it possible for bidders to propose an adaptation of the initial allocation and on other projects there were small issues on which the bidders could influence the risk allocation. Nevertheless, for most risks the allocation is ‘beyond discussion’. At the same time, bidders (of A2 Hooggelegen and Maasvlakte 2) agree they are not willing to share all information during a tender phase, even in one-on-one situations with the client. Not willing to share information results in a non-cooperative situation.

If a client would really want to make a risk allocation together with bidding parties, he should change the atmosphere during the tender phase e.g. by giving guarantees on sharing information.
Besides, the Maasvlakte 2 case shows that the discussed risks are not the largest risks during the project realisation. This is either because the discussion has led to a reduction of that risk or because one did not have a good view on what the most important risks are in the project. The latter is enforced by the fact that the problems, which occurred during the project in the cases, were not at all foreseen during the tender phase. This was already discussed before, together with the conclusion that it is necessary to keep optimising the risk allocation during the project. A recurring dialogue is useful for such optimisation, as the cases show that a discussion is necessary to be able to reallocate risks.

Finally, a dialogue creates the possibility to use the knowledge of the bidder on an early moment in the project. This was used in the Maasvlakte 2 case where bidders could react on the possible results from permit procedures.

**Consequences for risk allocation**

- A dialogue in the tender phase does not have the atmosphere for a bidder to discuss the project, the project’s risks and the bidder’s proposal fully with the client. If one would want to allocate risks two-sided, a change is needed in this atmosphere of the tender phase.
- Recurring dialogues are necessary to be able to use opportunities to optimise the risk allocation by reallocation, because at the start of the project one does not have all information to arrive at an optimal risk allocation.
- A dialogue at the start of the project can help to reduce the risks that are discussed during that dialogue.

**Analysis relation**

The cases show no use of criteria in the decision-making about the risk allocation. Allocation criteria are not used explicitly and do not form the arguments to choose for a certain allocation. This is different from what was proposed in the literature.

Nevertheless, the criteria can be recognised implicitly and have the following effect:

- “Expertise and the ability to influence” is the criterion that determines whether a risk should be allocated to a party. Often this goes along with the allocation of responsibility. Example: Uncertainty permits in Maasvlakte 2 project.
- “Bearing capacity to sustain” is dealt with by capping or sharing the risk in cases where bearing capacity is a problem. Example: Maintenance bridge in A2 Hooggelegen project.
- “Motivation to bear” is either dealt with because the party bears the consequences, or – in cases that the consequences do not influence the individual

10.2.4 Allocating risks based on the allocation criteria (expertise and ability to influence, bearing capacity to sustain, motivation to bear, competence to foresee and assess) leads to a more effective risk allocation
benefit of that party – by coupling individual benefit to total benefit.
Example: Interface Muiderbrug in the SAGO project.
- “Competence to foresee and assess” forms a problem when a party can best influence the risk, but is not able to assess the risk during the tender phase.
  A later transfer of the risk is then a solution.
Example: UXO in the Amsterdam-Rijnkanaal project.

This shows that only the ‘influence-criterion’ determines the allocation of risks and that the other criteria are used for fine-tuning of the risk allocation within that division.
This is certainly different from what the literature proposes: lists of criteria that all should determine the allocation of a risk. These lists seem to be impractical, because when no criterion is leading one might go on endlessly with looking for the right allocation. For example one party might be motivated to bear a risk, but is not able to influence a risk and the other is not motivated, but can influence the risk.

**Consequences for risk allocation**
- The use of criteria without one of them being the leading criterion as proposed by the literature is useless and impractical.
- An approach in which the ‘influence-criterion’ is used to determine the allocation of responsibility and risks and that the other criteria are used for fine-tuning within that allocation would be a more practical and realistic way of working.

**10.2.5** Pricing risks is only useful for risks that both parties can equally assess, influence and bear.

**Analysis relation**
The ‘listed risk’ approach of Rijkswaterstaat was for the SAGO project not nuanced enough and for the A2 Hooggelegen one thought the risks were too difficult to price and the procedure of ‘listed risks’ took too much time in the tender procedure. This shows the difficulty of pricing risks.

The Maaslakte 2 project did use pricing of risks and there could be seen this did not have a lot of effect on the risk allocation. The parties continuously had different perceptions and therefore assessed and priced the risks differently. Their pricing can clearly not be compared in order to find the party that can best manage the risk.
This difference in perception is another argument – besides the discussed influences of risk preference and of being either or not in competition – to state that just the pricing of a risk can not be used determine which party can better manage a risk.
Consequences for risk allocation
- Pricing risks is a difficult method for risk allocation.
- There are several reasons – different risk preference, either or not in competition and difference in perception – that show why the pricing of a client and the pricing of a contractor are incomparable. It should therefore not be used as a means to decide which party can better manage a risk.

10.2.6 Coupling individual benefit to total benefit (to stimulate the reduction of the impact of risks) leads to a more effective risk allocation.

Analysis relation
This relation is correct. Several examples in the case study, such as the SAGO project, show that coupling individual benefit to total benefit is a motivation for a party to reduce a risk of which the consequences are in the first place not relevant for that party.

In practice, it is hardly seen that such incentive is used to motivate the client: it is not strange that a client does not want to ‘punish’ himself, but one should realise that often the quality of the client’s work falls short. The example of the requirements in the permits in the Maasvlakte 2 case shows how an incentive for the client can be build in.

The Amsterdam-Rijnkanaal case shows there can be different incentives than financial ones. Motivation in the form of a good image or extra work is also a possibility. To be able to use such incentives, one has to know each other’s interests, because only then one can use the right incentive.

Consequences for risk allocation
- Coupling individual benefit to total benefit is an effective way to motivate a party to reduce risks that do not influence its own benefit. It is therefore a useful tool to optimise risk allocation.
- Incentives are hardly used to motivate the client himself.
- To be able to use the right incentive, one needs to know each other’s interests in the project.

10.3 Additional observations about risk allocation

10.3.1 The client creates risks by providing information thoughtlessly

Analysis
The cases show us examples of situations in which risks are created by the framework created by the client. The responsibility for this framework (specifications and information) seems to be neglected sometimes. This results in the provision of wrong information, such as the pumping station example of A2 Hooggelegen, inconsistent information, such as the asphalt example of SAGO and the portal example of A2 Hooggelegen, or an “overload” of information
for the bidders in the tender phase, as the pipes and cables in SAGO and the decontamination in A2 Hooggelegen show. Such wrong or inconsistent information or the overload of information create new risks and can lead to higher costs.

In practice, it turns out that the client does not always take into account this effect when providing information.

There are several things that could be the cause of this problem:
- The division of responsibilities is not explicit, which results in the fact that the client simply does not realise what his responsibilities are.
- There is no incentive for the client to make sure this work is done in a good way (although often higher costs will result in a higher price for the client, this is not an incentive that is clearly laid down beforehand).
- The client does not have the means (time, knowledge,...) to do the work in a good way. In that case this is warning, because this responsibility cannot be transferred and thus the client needs the means to do this work. The (often political) time pressure on projects lies often on the basis of this cause.
- The client does not realise what the consequences are of the poor quality of his work.

These causes differ probably per project, but the research does not give clarity on this.

**Consequences for risk allocation**

- The responsibility of the framework (information and specifications) is not transferable and will always remain with the client. The cases showed that making mistakes or neglecting this responsibility creates more risks. The client should therefore make sure he only provides information or specifications to the level he is capable of and be critical about the delivered work.

10.3.2 Using reference design reduces the ‘risk-thinking’ of the bidders

**Analysis**

By trying to reduce the transaction costs of the tender phase one often uses reference designs that need to be the basis for the pricing. The idea is that all bidders price the reference design – and do not need to design during the tender phase – and that after the award of the contract the real design phase is passed and optimisations can be made. This was also done in the SAGO and the A2 Hooggelegen case.

In these cases it is shown that mistakes in these designs led to problems later in the project. Although the client is responsible for the information, discussions arise about the resulting consequences and the project becomes more expensive as the pricing that is done for the extra work – arising from the mistake – is not done in competition.

One should realise that a contractor (bidder) in this situation is absolutely not stimulated to look for the risks in the reference design and make a ‘risk-conscious’ bid. He will not look for problems in the interfaces, mistakes in the design or inconsistencies, because that costs time and taking such things into
account will lead to a high, non-competitive bid. Besides, any optimisation that can be made will be for the benefit of the contractor.

The client should realise he allocates more risks to himself by using this reference design.

Nevertheless, it still remains a fact that such reference design reduces transaction costs. So, there is a trade-off between the reduction of transaction costs and the extra costs of bid that does not take into account most risks.

**Consequences for risk allocation**

- Using a reference design in the tender phase results in more risks allocated to the client. This means choosing for a reference design has influence on the risk allocation and therefore on all considerations about risk allocation.
- When deciding about the risk allocation and the use of a reference design, the client should consider whether he is capable of producing a reference design that creates less risks (potential costs) than this reference design delivers in terms of reduced transaction costs.

### 10.3.3 Time, money and scope increase the willingness to bear

**Analysis**

The cases show a clear relation between the willingness to bear a risk and the amount of solution space/margin to deal with that, in terms of scope, time and/or money.

A remarkable difference can be seen between the fast-track project (SAGO) and the dredging project (ARK). In both cases the client tried to spread the risks resulting from the uncertainty of the current situation, by not fully asking a fixed price. A part of the work had to be priced using unit prices (or something comparable), which formed the basis of the definite pricing as soon as there would be more clarity. In both cases the contractor had to pay the first part of the difference (until a certain percentage for example).

The difference is that the SAGO-contractor would rather not pay the first part and make it all ‘cost plus’ (more risk for the client), while the ARK contractor would as well do the work for a fixed price (more risk for the contractor).

This difference could be caused by the difference in size of the project, but in the interviews it seemed probably caused by the difference in time pressure. The ARK contractor argued that it was very important the client gave him such a long time for preparation, which made the contractor able to deal with all uncertainties, while the SAGO contractor experienced a large time pressure and thus a short preparation time, in which he had to deal with all vagueness and uncertainty around the current situation.

From the case study can be concluded that having the means and possibilities (in terms of time, money, scope) to deal with risks makes contractors more willing to bear the risks.
Consequences for risk allocation

- Having enough means (time, money, scope) to manage risks is necessary to deal with uncertainties. The more means, the cases study shows, the more willing a market party is to bear risks. The client has to take care, when deciding on risk allocation, that transferring risks and providing such means are in balance.

10.3.4 Client and contractor have different perceptions

Analysis
So, to deal with uncertainties one has to create margin to work with them. This seems logical and simple to do, but in the project A2 Hooggelegen can be seen that the client is not aware of the restrictions he creates and the contractor is not aware of the room he is given. Also how things are arranged in the contract, such as for example the classification in the Amsterdam-Rijnkanaal project, can be perceived in different ways.
Both parties have different perceptions of the arrangement, the contract, the information and their role. Good communication can reduce these differences and contributes to a clearer risk allocation, as was already stated in the literature: “Contract language alone is insufficient to clearly specify risk appointment between the contracting parties.” (Rahman and Kumaraswamy 2001)

The fact that parties have different perceptions is an issue on more aspects. For example the pricing of risks; these prices can hardly be compared due to the different knowledge and insight they have, which could be seen in the Maasvlakte 2 case.

Consequences for risk allocation

- The case study shows that the perception clients and contractors have of risks, their roles, the contract, the solution space, etc. differs strongly. Parties should stay continuously in dialogue to check whether they have the same ideas about the project.
- The difference in perception of risks is a reason to state that the pricing of risks of both parties should not be used in order to determine the division of risks.

10.3.5 The atmosphere during the tender is not one of trust

Analysis
The cases show that cooperation during the risk allocation process is hardly been done. Also during the tender phase other cooperation that is often sought – such as in the competitive dialogue procedure – hardly exists. Both the A2 Hooggelegen contractor and the Maasvlakte 2 contractor discussed the fact that they – and bidders in general – are often not willing to share information with the client during the tender, because of fear for abuse (cherry-picking) and
leakage (to the competitors). This fear is caused by a lack of trust and is not a solid basis for cooperation.

In the literature and the expert interview a lot is said about how important cooperation is and that it would be better if client and contractor would work together and jointly search for solutions. This means that the risk allocation practice – as well as the allocation process as the possibilities to discuss parts of the project – is far less cooperative than the literature suggests.

**Consequences for risk allocation**

- The case study shows no examples of two-sided risk allocation, but the current situation during tender phases turns out neither to be one in which the parties trust each other. This means that when deciding about the risk allocation approach, one cannot use a cooperative approach – such as a competitive dialogue procedure – just like that. In such case a change is needed in the atmosphere during the tender.

**10.3.6 Large uncertainties do not fit in a fixed price**

**Analysis**

In a lot of the cases it can be recognised that very uncertain parts of a project are hard to incorporate in a fixed price. These are for example uncertainties around the current situation (Amsterdam-Rijnkanaal) or about the requirements resulting from permit procedures (Maasvlakte 2).

Because of these large uncertainties, such parts are very difficult to price in the tender phase. For bidders is the only way to take such parts into account in a fixed price, adding a high risk premium. This is not beneficial for the client, as he only pays for uncertainty and not for the delivered work. The flexible pricing (cost plus) that is used in the examples is an effective way to deal with this problem.

**Consequences for risk allocation**

- In cases of large uncertainty one can better not ask for a fixed price on those parts of the project. This transfers too large risks to the contractor, which is expensive for the client. As seen in some of the researched cases, a ‘cost plus’ approach can be a solution for this problem. The advantage of such approach is that the prices are made in competition, but that it can be adjusted when more is known about the uncertain parts.

**10.3.7 Relation to project objectives**

As stated in section 1.6, the ‘right party’ – in the definition of effective allocation – depends very much on the project and project objectives and should always be seen in the perspective of the project. Looking at the cases, the following can be said in general about the effect of project objectives:

102

Time
When time is leading in a project, as for example in the SAGO project, the optimal risk allocation (who can best bear which risks) remains generally the same. It is nevertheless important – even more than it is for every project – to consider the allocation of long-term procedures, such as planning procedures, permits, some pipes and cables, as the SAGO project showed. It is useless to transfer responsibilities which a contractor is not able to finish in time. Besides, incentives to finish in time are very useful to make a risk allocation suitable for a project with high time pressure. The example of the Muiderbrug interface showed this effect.

Money
The case study did not provide in a project where budget was explicitly leading, but it did show some important things to take into account when budget is important. As stated in the previous section (10.3.6) large uncertainty is expensive. In cases with a very restrictive budget, the uncertain parts of a project can thus better not be transferred for a fixed price. Bidders will ask high prices for these parts, so a more flexible approach can help here to reduce the price for the client.

Quality
Quality was leading in some parts of the Maasvlakte 2 project. What is important in such projects is that maximising quality is not directly in the interest of the contractor. It is therefore necessary that the contractor is well motivated to deliver quality and that the client knows how to test the delivered quality by the contractor. Incentives could be built in the contract or an alliance form could be a solution. In the latter case, the interests, but especially the knowledge of both parties is involved and by working together, the parties are more willing to look for optimisations. This was seen in the Maasvlakte 2 case with the alliance for the hard seawall.

10.3.8 Influence context variables

In section 5.3 context variables that seemed relevant are discussed. The first seven were taken into account in the analysis and the other context variables – except for the ones that were not taken into account at all – had to be taken into account on the parts where variations seem significantly. These are all discussed in this section.

Singularity of the project
This variable shows two effects in the case studies:
- When parties are involved in a unique project (very large, special technology, lot of media attention, etc.) they are more willing to, jointly, optimise the project and find solutions for occurring problems. This means the parties
are willing to deal flexibly with the risk allocation and what is arranged in the contract.
- When a project is a kind of work that has never been done before (as for example the Maasvlakte 2), there is more uncertainty about for example what kind of requirements will result from permit procedures. This means that more uncertainty exists in such projects, which will result in a different approach for risk allocation.

**Technical complexity**
Technical complexity was only of influence in the Maasvlakte 2 case. The difficulty of the design of the hard seawall made the contractor to propose an alliance for that part of the work. This was an adjustment of the risk allocation. In other cases the variable did not seem to be of any influence.

**Complexity in interfaces**
This variable seems to be more a cause of risks than of influence on the risk allocation approach. The cases show that large complexity in interfaces need more attention to risks in interfaces, but there is no difference in the approach of risk allocation.

**Uncertainty about the project at the start**
The case study shows some examples of large uncertainties at the start. Two methods of dealing with these uncertainties are used:
- When there is large uncertainty about specifications of the project (for example quantities and quality of spoil or requirements resulting of permit procedures) a ‘cost plus’ instead of a fixed price can reduce the effect of the uncertainties. This was already discussed in 10.3.6.
- When it is unclear whether specific work has to be done or not (as in the example of UXO in the Amsterdam-Rijnkanaal) a possibility of later reallocation can be a way of dealing with this uncertainty.

**Form of contract**
The case study shows a lot of tailor-made contracts. In the analysis hardly any influence of this variable can be recognised. The only influence that is relevant is the fact that tailor-made contracts are not known with the bidders, which means they do not directly understand the arrangements that are written down in the contract.

**Degree of margin (time/budget/…) - Solution space of the project**
The effect of these variables is in fact already discussed in section 10.3.3: margin and solution space are necessary to deal with uncertainties and need to be taken into account when dealing with risk allocation.
Size of the project - Competence of the parties - Project organisation - Type of actors (client)

These context variables varied only at one project significantly. Because this was due to the same reasons and they all had more or less the same effect, this is discussed at once.

The Maasvlakte 2 project was the only project that did not have Rijkswaterstaat as client. It was also the only project that was far larger than the rest. For the Port Authority Rotterdam – which was the client – this project was very large and especially a lot larger than what they were used to. Because of that, the client decided to hire a lot of expertise to form the project organisation and support the Port Authority in this project. This resulted in a very competent project organisation.

Next to that, the size and the uniqueness of the project made it possible to create a special approach – in terms of contract and tender procedure – for this project. Altogether, this led to a very well thought tender procedure, contract and risk allocation.

In other cases these variables seem more or less the same.

The Amsterdam-Rijnkanaal project also differed in size from the other projects – as it was smaller than the rest –, but this did not seem to have any effect on the risk allocation process.

Degree of risk-thinking

This variable was difficult to recognise in the projects, but it seemed there were no remarkable differences between the projects. Probably the largest differences on this variable will be between individual persons instead of project organisations. It seemed nevertheless not to have significant influence on the results of this research.

Risk profile

The most remarkable thing seen on this aspect is the fact that in cases of large complexity and difficult projects one is inclined to use more ‘cooperative’ forms of contract and risk allocation. In contrary to more simple works in which one is inclined to keep the arrangement black-and-white.

10.4 Overview

The results of the case study confirm a lot of the things that were expected from the theory discussed in the first part of this report. The use of a strict division of responsibilities, allocating risks according to the division of responsibilities and the use of incentives are all confirmed by the cases.

Nevertheless, there are also differences with what was expected from the theory.
It turns out policy and budgetary considerations have much more influence on the risk allocation than just project specific reasons. This makes decision-making on risk allocation much more complex.

Also, the use of allocation criteria is quite different in practice from what the literature prescribes. On this point, the literature is quite impractical.

Finally, the theory only discusses the allocation process before contract close, while in practice in complex and/or long lasting projects, it seems also important to keep discussing risk allocation during the whole project.

Remarkable in the findings is the fact that the effect of risk allocation is disrupted strongly by some side effects.

On one hand, the effect of a well-thought risk allocation is diminished by the fact that agreements, contract documents and risks are perceived differently by the parties. The parties think they agreed on those things, but it turns out they have different ideas about it.

On the other hand, risk allocation is also disrupted by the quality of work delivered by the client. By providing information, specifications or a reference design that has inconsistencies, deficiencies or other mistakes, more risks are created. Moreover, the risk allocation is changed as the client draws back risks by making these mistakes.
Phase 3
11 Recommendations

11.1 Introduction

This chapter needs to answer the last research question:
- How can the information about the propositions and other mechanisms be used to do a proposal for improvement of effective and efficient risk allocation?

For the answer on this question the results from the cases, discussed in chapter 10, are used. The ‘consequences for risk allocation’ are translated into recommendations.

All recommendations are directed at clients and client’s organisations. These are the people that organise the allocation process and are able to use the findings of this research. These recommendations follow on the findings of the case study and are categorised in recommendations that deal with risk allocation itself (risk allocation in the contract), with risk allocation through the course of a project and with the organisation of clients.

Although making a risk allocation is part of the preparation phase of the project they are discussed separately, because the first section (11.2.1) deals with the actual allocation of risks, while the second section (11.2.2) deals with the process around risk allocation during the course of the whole project. The third section (11.2.3) is not about risk allocation in one single project, but about the organisation dealing with several projects.

In 11.3 the recommendations are concluded and finally recommendations for further research are given in 11.4.

11.2 Recommendations for risk allocation

11.2.1 Risk allocation in the contract

These recommendations deal with the way one should allocate risks. This is the basis of risk allocation. A tool based on these recommendations to create such risk allocation is described in appendix E. As said in the introduction, making an initial risk allocation is part of the preparation phase, but is discussed separately.

- Make the responsibilities allocated to both parties explicit.
- Allocate risks according to the division of responsibilities.
- Use the allocation criterion ‘expertise and ability to influence the risk’ to check the risk allocation and the other allocation criteria for fine-tuning of the allocation (see appendix E).
- Do not use pricing of risks as a means to find out which party can best manage a risk.
- Use the coupling individual benefit to total benefit to motivate a party to reduce risks that do not influence its own benefit.
- Use a strict division of responsibilities to create clarity, which results in an efficient risk allocation. In case of large risks a less strict division (i.e. one in which both parties deal with the same issues) can be used to reduce the risk. In such situation one can best jointly look for the best way to deal with this large risk.
- In case of large uncertainties use flexible solutions instead of a fixed price for that part:
  - When there is large uncertainty about specifications of the project (for example quantities and quality of spoil or requirements resulting of permit procedures), use ‘cost plus’ instead of a fixed price.
  - When it is unclear whether specific work has to be done or not (as in the example of UXO in the Amsterdam-Rijnkanaal) use the possibility of later reallocation.
- If the budget is limited and staying within this budget is the leading project objective, do not transfer large uncertainties within a fixed price. Uncertainty is expensive, so this will not be the best solution in case of a rigid budget. So, the solutions mentioned above are even more important when budget is leading.
- If quality is the leading project objective, build-in strong incentives or consider alliancing for the relevant parts of the project. Delivering quality is not directly in the interest of a contractor, so incentives are necessary to motivate him. Alliancing can especially be interesting when the knowledge of both parties is needed to achieve a high quality solution.

These recommendations can be used to make a very project specific risk allocation, but can also be used with a basis of standard conditions. In that case using the recommendations is to ‘check’ the initial allocation and, if necessary, apply some project specific fine-tuning.

11.2.2 Risk allocation in the course of a project

Making a well-considered division of risks is not enough to fully use the effect of risk allocation. As the conclusions showed, the full project has to be taken into account when dealing with risk allocation and there are side effects that reduce the effect of risk allocation. The following recommendations deal with the full process of a project and with these side effects.

Preparation phase
- If time is the leading project objective, check long-term procedures that are needed for the project (such as permits, pipes and cables, etc.) and start them yourself. In this way you reduce the chance of transferring responsibilities that can not be realised by the contractor in time.
- If you are planning to use new approaches (such as tailor-made contracts), different from what is standard practice, make an early start with communicating them to the market parties. Market consultations are an appropriate way of doing that. Such new approaches bring new risk allocations, different from what market parties are used to. By starting to communicate early, the difference in perceptions about the approach can be reduced.

Tender phase
- Supply information and requirements only to the level that you are capable of to deal with. It creates risks when mistakes are made in the information and requirements.
- Before providing information:
  - Ask yourself what information do bidders really need to make a bid. Do not supply more information than necessary for the bid. It only creates more work for the bidders and vagueness around the information when bidders are overloaded with information.
  - Ask yourself whether the information is correct. Create a quality check before providing information. In this way mistakes in the information are reduced, which reduces the risks for the client.
  - Show bidders why information is provided. In this way bidders can better filter important information and use it for their bid. This reduces transaction costs.
- Check whether the provided means (in terms of time, scope and budget) are in balance with the transferred risks.
- Organise a dialogue in the tender phase to check whether all parties have more or less the same idea about the project and the contract, to discuss large risks in order to take the right response measures and to know each other’s interests in the project.
- If a reference design is used, apply a risk analysis on (the use of) this design and check whether the reduction of transaction costs outweighs the use of the design. If not, it can be disadvantageous for the project to use a reference design.
- If two-sided risk allocation is desired, for example in the case that bidders have to come with own solutions, it is necessary to be able to communicate openly with the bidders. Therefore you have to take away the fear of bidders to share information, for example by giving guarantees.

Realisation phase
- Organise a recurring dialogue with client and contractor to check whether the ideas about the project are still the same and place every now and then the topic ‘division of responsibilities and risks’ on the agenda of project meetings to check whether these divisions are still optimal.
- If new information becomes available that lead to new insight on the project (for example extra work that has arisen), it can be useful to reconsider the
division of risks and responsibilities. Discuss this with both parties and make reallocation of responsibilities and risks possible.

11.2.3 Risk allocation and the client’s organisation

Besides the risk allocation in a specific project, there also needs to be attention for the client’s organisation. It is already discussed that issues like policy can disrupt the optimisation in risk allocation. Recommendations for the client’s organisation, which is in this research specifically Rijkswaterstaat, are discussed here.

- To create an optimal risk allocation, policy should be less important. But, this is stated from a project point of view and is not always optimal for the client’s organisation. Standardisation can be useful for efficiency in an organisation. The balance between specific approaches and standard procedures lies outside the scope of this research. Nevertheless, the following recommendation can be given:
  - When using standard approaches, make them very good. Make sure you are, as an organisation, able to deal with the responsibilities and risks that are always allocated to you.
  - Political time pressure causes large risks, as it puts a lot of pressure on the preparation phase. The research showed that mistakes in the preparation of a client can create a lot of risks. In order to keep projects manageable, parties like Rijkswaterstaat should offer more resistance towards this political influence.

11.3 Risks allocated: problem solved?

Now we know how to deal with risk allocation: we know that the basis of risk allocation is the division of responsibilities, we know how to use allocation criteria and we know where to build-in incentives.

So, risks allocated: problem solved?

No. There is more to risk allocation than allocating risks. The provision of information has large influence on what effect the risk allocation has. There is insufficient awareness of this effect. Furthermore, risk allocation is not finished when risks are allocated, but needs to get attention through the whole project. This is important to be able to deal with new insights. Finally, client and contractor have per definition different perceptions of the project, their role and the risks. This needs attention when dealing with risk allocation and later during the execution of the contract.

Altogether, risk allocation is more complex than using the allocation criteria and the right incentives. Nevertheless, the current practice can be improved by small adjustments.
A well considered initial risk allocation, based on the approach of appendix E, as a starting point, providing information with a reason and after a quality check, and recurring discussions between client and contractor about these topics, could improve a lot.

11.4 Further research

During this research the following topics are discussed but not extensively researched and could be reason for further research:
- What is the effect of standard conditions? Does it lead to clarity and familiarity? Or to laziness and ignorance?
- There will be results soon about projects in which pricing of risks is used. How did this mechanism work? Did it lead to a better risk allocation? Or not?
- This research proposes the motivation of a contractor to enlarge value (coupling individual benefit to total benefit). This can result in rules for the contractor that he has to obey to receive a bonus. The question is whether the contractor now strives for more value or only is ‘keeping up appearances’ (strategic behaviour). How should this incentive be designed to have maximum effect?
- The cases show sometimes vagueness about the division of responsibilities, but it remained unclear whether there are reasons for parties to do this deliberately. This could be a topic for further research.
- The cases show sometimes low quality work of client. It remained unclear what caused this. This could be a topic for further research.
12 Epilogue

After nine months studying risk allocation in the Dutch infrastructure I will finish this report with a reflection on what I have seen and what I have done.

Reflection on what I have seen
Infrastructure projects are ‘risky business’. Not just because of unknown soil conditions, extensive permit procedures or the heavy traffic, but especially because of the many people and parties involved, all with their own interests. These different interests cause the never-ending conflict between client and contractor; regardless of how well you organise the contract and how cooperative the relation is.

The interests of politicians cause extreme risks by putting high time pressure on the projects. I find it remarkable (or better, I was shocked) what large risks are taken, just to finish in time for the minister.

And finally, all these people involved are human, able to make mistakes. During the research it could be seen how large the influence of people’s mistakes can be.

All these effects caused that this research is not (alone) about which risk should be allocated where, but far more about what happens around risk allocation and how people deal with it. This made the research more broadened than expected beforehand.

Reflection on what I have done
If I would do the research all over again, some things I would do differently. I would pay more attention to standard conditions and their risk allocation. The cases I used mostly have a tailor-made contract, which is different from ‘any regular project’. Nevertheless, I think the research shows a lot of information that is relevant for smaller projects that use standard approaches.

Besides, I would work out the method of analysis before starting to collect data. In that way you know better what to look for and what to ask. This could have resulted in more interesting data for my research.
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Appendix
A Approach expert interviews

Hoofdvraag: wat doet er allemaal toe als je risico’s goed wilt alloceren?

Laatste project (of anders)

-Was er sprake van een risicoallocatie-proces?
-Hoe was risicoallocatie georganiseerd?
-Heeft dit goed gewerkt?
-Waarom heeft het goed gewerkt?
-Waren er ook negatieve kanten?
-Wat veroorzaakten die?
-Wat zijn volgens u kenmerken die er voor zorgen dat dit proces goed gaat?
-Wat zijn volgens u kenmerken die er voor zorgen dat dit proces minder goed gaat?

Dit is een samenvatting van wat de theorie ‘voorschrijft’

-Doet u dit ook zo?
-Waarom anders? Wat zijn redenen om het anders te doen?

B Interview protocol

Algemeen project
- Vanaf welk moment bent u betrokken geweest bij dit project?
- Tot wanneer bent u betrokken geweest bij dit project?
- Wat was uw rol in dit project?
- Wat was naar uw mening het belangrijkste onderdeel waarop dit project werd gestuurd (t/g/k)?

Verloop proces
- In hoeverre werd er gesproken/lag er wat vast over de verdeling van verantwoordelijkheden en risico’s op het moment dat u betrokken bent bij dit project? Of: vanaf wanneer is er gesproken over…?
- Kun t u het hele proces omtrent de verdeling van verantwoordelijkheden en risico’s tot het moment van contractsuitoening beschrijven? Wie waren er op welk moment betrokken? En wat waren de argumenten wanneer er besloten moet worden over een specifiek risico?
- Zijn er na de sluiting van het contract, tijdens de uitvoering, discussies geweest over de precieze allocatie van bepaalde risico’s of verantwoorde lijkheden (al dan niet naar aanleiding van het optreden van een risico)?
- Verwacht u nog discussies over de precieze allocatie van bepaalde risico’s of verantwoordelijkheden?

Verdeling
- Heeft u het idee dat beide partijen begrijpen hoe de verantwoordelijkheden en risico’s zijn verdeeld?
- Heeft u het idee dat de verdeling van de verantwoordelijkheden op de meest optimale manier is gedaan?
  - Waarom wel/niet?
- Heeft u het idee dat alle risico’s bij de juiste partij liggen? Ja/nee/deels.
  - Waarom? (bij ‘deels’: Welke? Waarom?) Nee: hoe komt dat?
- Wijken de verdeling van verantwoordelijkheden en risico’s van elkaar af?
  - Op welke punten?
  - Waarom?
  - Wat is uw mening hierover?
- Zijn er risico’s waarbij de verantwoordelijkheid van de respons anders is gealloceerd dan de verantwoordelijkheid van het gevolg?
  - Welke?
  - Waarom?
  - Wat is uw mening hierover?
- Zijn er risico’s gealloceerd bij een partij waar geldt dat wanneer dit risico optreedt, de andere partij daar nadeel van ondervindt? Bijv. weerrisico’s bij
ON die leiden tot vertraging wat nadelig is voor OG. Is voor deze risico’s een vertaling gemaakt in de prijs?

Context
- Wat is naar uw mening het effect van (uniciteit van het project, oplossingsruimte in het project, complexiteit van het project (technisch en in interfaces), onzekerheid over het project bij de start) op de verdeling van de verantwoordelijkheden en risico’s?
C Transcript case interviews

Case A: Spoedaanpak Amsterdam – ’t Gooi

<table>
<thead>
<tr>
<th>Client: Rijkswaterstaat</th>
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<tbody>
<tr>
<td>Rudie van der Wal</td>
<td>Contract manager</td>
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<tr>
<td>Wiebe Witteveen</td>
<td>Central ‘core group’ fast-track projects</td>
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**Contractor:** VolkerInfra

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<tr>
<td>Dick Stoop</td>
<td>Project director</td>
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<td>Hans Kitslaar</td>
<td>Tender manager</td>
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Case B: A2 Hooggelegen

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<th>Client: Rijkswaterstaat</th>
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<tr>
<td>Marco de Regt</td>
<td>Contract advisor alliance</td>
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**Contractor:** Trajectum Novum

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<tr>
<td>Eddy van Haastregt</td>
<td>Contract manager alliance</td>
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Case C: Dredging Amsterdam – Rijnkanaal

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<tr>
<th>Client: Rijkswaterstaat</th>
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<tbody>
<tr>
<td>Frank van der Hell</td>
<td>Contract manager</td>
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<td>Jeanis Lam</td>
<td>Risk manager</td>
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**Contractor:** Boskalis

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<tr>
<td>Thijs Woolderink</td>
<td>Project manager</td>
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Case D: Maasvlakte 2

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<tr>
<th>Client: Port of Rotterdam Authority</th>
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<tbody>
<tr>
<td>Jan Ochtman</td>
<td>Tender manager</td>
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**Contractor:** PUMA

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<tr>
<td>Peter van der Linde</td>
<td>Member Board of Directors</td>
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General information project
Rudie van der Wal is contract manager for the cluster of projects SAGO. SAGO is a cluster of road projects in which all kind of quick measures, widening and betterments of the roads A1/A6 Diemen – Muiderbrug – Almere and A1 ’t Gooi is done, which should result in enlarging the highway capacity. From now on where ‘project’ is mentioned, ‘cluster of projects’ is meant.

In contrary to the normal role of a contract manager – only involved in the realisation phase – in this project the contract manager is already involved in the preparation of the tender phase and the tender phase itself.

There has been a project team for the part A1/A6, which is discontinued in March/April of 2009. On that moment is decided that this part should be accepted into the fast track approach and be combined with the part A1 ’t Gooi. The technical information and results of the former project team were saved, but a new approach for the contract was chosen, as the project now fell under the fast-track approach. This was also the moment Rudie van der Wal got involved.

The project is firstly steered on time and secondly on traffic hinder. The steering on time shows in an incentive for early delivering: there is a target date, which is a wish and when finishing on this date there will be a very large bonus, and an end date (‘milestone’), which is the last moment of finishing possible. The bonus decreases when crossing the target date linearly to zero at the end date. Delivering after the end date will result in penalties. These dates are laid down politically.

The steering on traffic hinder can be recognised on two points. Firstly, traffic hinder was one of the criteria in the MEAT-procedure (Most Economically Advantageous Tender) and, secondly, in the contract there is a bonus/penalty arrangement for deviations of the awarded arrangement. So in other words: the project is awarded to the MEAT-contractor with a certain amount of traffic measures and the contractor is in the end paid based on the realised amount of traffic measures. One can see the contractor is optimising on this point.

Preparation and tender phase
The general ‘philosophy’ of the fast-track approach has had a clear mark on the contract and the tender phase. Beside the fact that the project had to be tendered in a non-public tender procedure, the main goal of the tender phase was to find the ‘expert’ that can help the client to realise the project. This meant that this expert should be able to oversee the whole project and even be able to ‘coach’ the client. To be able to do this, this expert should have insight in the
risks of the client and how he can reduce those risks. This idea is all based on the ‘best value procurement’ ideas.

To realise this, in the tender procedure is – instead of entire plans – asked for a risk file, an opportunity file, a planning and interviews with key persons. In the latter the focus was on the questions: Do these people know what the project is about and what critique parts of the project are? Do these people stand for their role? In the risk file the bidders had to show which risks they see for the client and how they will manage these. These ‘client risks’ are for example the risks that are introduced by having a parallel plan study: adjustments or delays caused by this study, or developments with the road manager on the field of electronics. Later is explained how is dealt with these risks.

For the preparation of the tender procedure a lot was already done: writing down the tender procedure was done for the fast-track approach in general, a lot of technical work and external stakeholder management was done by the former project team. Only some traffic measures needed to be worked out.

Still, the preparation of the contract needs a lot of effort. Getting all parts of the contract in line and forming one consistent document cost a lot of time. But it was worth it, because it resulted in a good contract.

**Division responsibilities and risks**

The general idea is that the contracted ‘expert’ does all tasks, but certain areas Rijkswaterstaat keeps with herself. This is mostly public communication. And more evident: contract management (but that is not transferable to the contractor). This seems the most optimal division of tasks for Rudie van der Wal. Half a year of maintenance is contracted and will afterwards be continued in the existing maintenance contracts. There was no need for a financing part in the contract, as there was budget available for this work.

The statement “the contractor does everything, except the public communication” is correct and all-embracing for the division of responsibilities. Still, the contractor is dependent on the client for the framework he gives: rules, information, possibilities, etc. There are no real agreements about what happens when adjustments are made in this framework. On such moments a proposed change will be made and processed. In fact, this framework is also the responsibility of the client.

The allocation of risks is according this division of responsibilities: all risks with the contractor, except those that deal with public communication and changes in the framework. These latter are in fact the ‘client risks’, which are introduced earlier.
All mitigations for ‘client risks’ (see above) proposed by the bidder will be part of the contract and have to be realised by the bidder/contractor. The risks stay with the client, who has a contingency fund from which he pays effects of these risks that might occur. What is left of that fund will be split with the contractor (he will get a quarter of the total amount).

The contractor does not have influence on the cause of these risks, but can reduce the effect of the risk. So the better he reduces the effect of these ‘client risks’ the higher the bonus at the end of the project.

There is no real clarity about what risks will be paid from this fund. More or less the contingency fund is for events that influence the achieving of the project goals. This has until now not led to any problems, but each time again one reweighs how a certain event has to be paid: always by the client (as they are client risks), but sometimes from the contingency fund and sometimes from another fund.

An example is the quality of the asphalt. The rerouting of the traffic over the road will probably lead to damage of the asphalt. Therefore the asphalt needs to be replaced. This is a typical client risk that is necessary to reach the project goals and will thus be paid from the contingency fund.

There have been no adjustments of this division during the tender phase. There were some adjustments in the framework, but those are dealt with after the award of the contract.

In general one can state that the allocation of risks is very clear and strict, but that some vagueness remains about the different types of client’s risks. This determines whether or not consequences of risk events are paid from the risk fund or from something else. This only has effect on the height of the bonus that remains for the contractor.

**Realisation phase**

It seems that on this moment some delays have developed in the plan study of the A1 ’t Gooi part. This is mostly dealt with by already starting with parts of the work that do not need the plan study decisions. If in the end still things go wrong, the effects of the occurrence of this risk are with the client, but this is not likely.

There is some complexity in interfaces: another project (Muiderbrug) falls within the working field of this project. This project is of another client and another contractor, but has major interfaces with the SAGO-project in terms of planning, techniques and traffic flow. Initially one had taken into account a time buffer between the two schedules, but it seems the schedules now are approaching each other and it is possible that problems arise because of the delay in the Muiderbrug-project.

The SAGO-contractor has an ‘obligation to coordinate’ with the other contractor to make sure the end date of the SAGO is not in danger. This is the responsibility of the contractor and remains also with the contractor. When this
becomes a problem for the end date, the contractor will ‘feel’ this in the bonus or penalty he receives at the end. This is his motivation to solve this problem in time and he could even use this bonus to motivate the other contractor of the Muiderbrug.

Still, it remains a problem for the client in terms of communication. If their communicated information appears to be wrong, their credibility will decrease.

Rudie van der Wal feels that a contractor will always try to transfer the effects of risks back to the client. He will be pushing the boundaries to see what is possible. Although it is clear in the contract, there are all kind of arguments used to do this. For example, if the road manager does not mind to give some extra time for certain activities, this could be seen as no extra traffic hinder.

Still, in this project, the contract is leading and no adjustments have been made here.

The target date and the end date stay the same, even when client risks occur and cause a delay.

Hardly any extensive discussions have taken place, because the initial division was so clear and complete that it was easy to fall back on.

**Context/project specificity**

The fact that there is a clear division of tasks and responsibilities and that there have been no adjustments in this division, definitely depends on the fact that this is a technically simple project. Besides, there was a small solution space: a great part of the project was already decided on.

Complexity in this project is found on the field of time: it has a very short lead time in which the project should be realised. This means on average 2.5 million euros are turned over every week, which is even for Rijkswaterstaat a large amount. A lot of people and a lot of processes thus need to be managed in this short time.

This project knows few uncertainties and also a small solution space. This leads to less need for discussions on risk allocation.

Special about this project is the contracting of an ‘expert’, who is coaching the client, identifies problems himself and from who can be expected more than usually. There is a good cooperation between the client and the contractor, which makes the work better.

In this project the policy of Rijkswaterstaat works guiding and definitely not restraining. It could be that this is restraining for more complex projects.
General information project

The minister wanted to start 30 projects and finish 10 projects within his cabinet term (before May 2011). Rijkswaterstaat joined this ambition in September 2008. Already a lot of work was being tendered in 2009 and the fast-track projects (16 had still to be tendered) were added to that. Therefore a consultation of the market was organised to discuss this situation with the market parties. In this consultation became clear that the parties could handle this work, as long as the transaction costs and time of the tender phase would be minimal. In the tender phase parties put in their best people. Tendering all those projects separately would mean a waste of time and energy. Therefore it was needed to have a short tendering time for all these projects.

Preparation and tender phase

On that point, fall 2008, Wiebe Witteveen got involved. Together with one other person (Carlita Vis) he developed an procurement strategy. In this plan combinations of projects (packages) are sought in order to reduce the needed tender capacity. Making the right combinations has been an intensive process with a lot of internal discussion. They also looked for possibilities to reduce the tender time and transaction costs without cutting back on the project objectives and methods to avoid designing during the tender phase (target pricing). For inspiration they looked at several foreign approaches among which the Best Value Procurement theory of Dean Kashiwagi. This latter was the basis for the procurement strategy. The 16 project that needed to be tendered were clustered in 6 packages and tendered with this strategy.

The next step was the development of some generic contract documents based on the procurement philosophy. Biggest part of the contract documents was the same for all packages in order to have a uniform approach for all these projects, which again reduces the work for the bidders. The (decentralised) project teams for the individual packages (under which SAGO) needed to develop the specific requirements per package/project, while the rest of the tender documents was uniformly made.

The tender phase and the evaluation of the bids were executed by the project teams as they were also the teams that would needed to work with the selected bidder in the realisation phase. The central team (which developed the procurement and contract strategy) did attend the information rounds and the evaluations to guarantee the philosophy and the consistency between the packages.
All tenders are finished in time, which means they completed the tender in four months. Normally a tender procedure takes eight months.

The central team stayed involved after contract closure to realise a certain change in the relation between contractor and client. This is still based on the ideas of Best Value Procurement. The idea here is that the contractor is the ‘expert’ that guides the client to the project’s success.

Division responsibilities and risks
To guide the client in the project, the contractor is asked to dedicate himself not only to his own risks and responsibilities, but also to the client’s risks.

The contract is mostly based on the general conditions in the UAV-gc. Rijkswaterstaat had decided to take the conditions from the UAV-gc into a whole new document, instead of having the UAV-gc applied and adding a list of exceptions. In that way everything is in one document which can be read easily.

Remarkably enough, in the information rounds some questions were asked about the conditions which were copied from the UAV-gc. The market parties were thus calling their ‘own’ conditions into question. Most questions however addressed the specification and the quantity of bills.

One of the most important differences with the UAV-gc is the fact that not design and execution are transferred to the contractor in one assignment, but that first the assignment for (part of) the design is given and later the assignment for (part of) the execution. This is done to be able to deal with the risk of the planning procedures that are still running. Now the contractor can start with the design and even with some parts where no planning procedures are needed or where they are already finished and the assignments for the other parts come on a later moment. In this way one is not only able to deal very flexible with unsettled planning procedures, but also the consequences for the client are smaller as he has to pay 5% of the total assignment when in the planning procedures the work is decided to be invalid when the project has to be cancelled due to the road study (road study = plandstudie).

Another difference with the UAV-gc is the pricing. In the pricing generally lies a large part of the risk and work in a tender for a contractor. Especially when a fixed price is asked he will need a detailed design to be able to price the work with a reasonable amount of risk. Making a detailed design with all tendering parties leads to a lot of transaction costs in the tender phase, which was exactly what should be reduced in this approach. Therefore Rijkswaterstaat has chosen to work with a bill of quantities from a reference design of Rijkswaterstaat which had to be priced. Based on those prices the work is awarded. Later in the process, when the final design is made, the total budget is determined from the final quantities and the unit prices from the bid. The budget is adapted if the
quantities differed more than (+/-) 5% from the reference design. If the contractor could stay within that range of 5% he would receive a bonus. This approach could be used because the work was quite simple and there was not a lot of solution space.

A third difference with the UAV-gc is the use of a Board of Experts, one for all sixteen fast-track projects that deal with this form of contract, to deal with differences of opinion between client and contractor.

Next to this, there are bonuses in the arrangement that motivate the contractor to finish in time, which is the most important aspect of these projects.

As said before, a fifth difference is the fact that the contractor is asked to dedicate himself to the risks of the client. This is done in the tender phase by asking for a risk and opportunity file with the responses he will take to reduce respectively enlarge those, which were taken into account as an awarding criterion. The responses of the awarded bidders are added to the contract. Besides, one would also like to have the contractor to deal with client risks which were not taken into account during the tender. Therefore the client has a risk fund from which all costs for risks (responses as well as consequences) are paid from. What is left from that fund is paid for 25% to the contractor as an incentive.

The division of responsibilities could be described in the following way: the client remains responsible for the road study (WegAanpassingsBesluit) and obtaining the resulting permits in time, for the acquisition of land if necessary, a part of the pipes and cables (with a long lead time), the correctness of the provided information (outside the range of 5%), part of the connection to the traffic control centre and ‘the remaining’ (design, execution, some pipes and cables, some permits) is the responsibility of the contractor.

In the division of risks there are four categories: contractor risks, unforeseen external risks (changes of scope and external interface risks), risks in the risk fund (‘client risks’) and the pricing risk.

Contractor risks are the risks that go along with the responsibilities of the contractor. The changes of scope are changes from outside the project that nobody had foreseen, which are paid by the client (not by the risk fund). The risk fund covers all client risks which are dealt with by the contractor (by response measures etc.) as explained above. The contractor gets the costs plus 5% and a quarter of what is left from the fund.

The pricing risk is the risk the contractor takes by using the quantities given by the client and making some assumptions about the work to make a bid price. This risk is in fact ‘capped’ at 5% as explained above. If something unforeseeable and unexpected happens which officially lies within that 5% arrangement,
but should reasonably not lie with the contractor, there is a possibility to discuss and adjust this. Of course this cannot be determined beforehand.

Although these divisions might be strict, good cooperation is needed to get to the right result. In that way the contractor knows how to deal with the client’s risks and the client can help the contractor with the insight it already has of the project. As a client, one needs to care about the balance here between cooperation and interference. Nevertheless, cooperation and competition is always a trade-off. In this contract is tried to bring the interests of both parties in line in order to reach the project objectives. In these projects also is decided to use only one risk file for the risk management, instead of one for the client and one for the contractor. This is derived from the idea that the contractor is the expert that guides the client towards project’s success. In this way the client is also stimulated to deal in the right way with its own risks.

Rijkswaterstaat has tried to arrange a reasonable risk allocation which is aimed at early opening. This is why parts of the permits and parts of the pipes and cables are done by Rijkswaterstaat and the other part by the contractor. Wiebe Witteveen thinks that this allocation is reasonable and in fact quite ‘traditional’ (same as in standard D&C contracts). In the contract are several bonus arrangements, which means the contractor can often cover loss at one point with gain at another point. He does not necessarily profit from the work, or the extra work, which is normally the case, but he profits from delivering good work (the bonuses). If in the end the project objectives are reached and the contractor yields a good return, everybody can be satisfied.

An option was to make the contract even more integral than it is by incorporating the planning procedure with the responsibility of the contractor, but here the time aspect was leading. Some planning procedures were already in progress, so this was the shortest approach. There hasn’t been any discussion during the tender phase on the division of risks and responsibilities. In the individual information rounds was room to discuss the risk allocation, but because of the time pressure it was hardly possible to change the contract. Besides, contractors could stand out by dealing with the risks in their way (the responses of the client’s risks). Wiebe Witteveen thinks that this ‘traditional’ risk allocation is a good starting point, but that there should be possibility to adapt that allocation. In one of the packages a contractor proposed (in the realisation phase) to take more responsibility on the pipes and cables, because he thought he could handle that work in a better way.

When starting with all risks allocated to the contractor, the client will pay a high price.
The whole approach of incentives to deal with the client’s risks in the risk fund and the award criterion on the risk and opportunity file is a more nuanced way of dealing with risk allocation than the listed risks approach (then it is all or nothing per risk).

**Realisation phase**

In the realisation phase the central team helps the contractors (in the different packages) to incorporate the contract philosophy at some points. There is also a weekly report from each package, which is checked by the central team in order to control the total of packages. The weekly reports are wrapped up into a Directors Report which is sent to the “Directeur Projecten” (responsible for the fast-track approach). Nevertheless, the responsibility for the projects/packages is still with the project teams.

Sometimes the central team is asked to help when things go with difficulty. This happens now and then, mostly because the contractor has difficulties with the way of working. In the SAGO package things go quite well. There have been situations, also with SAGO, where it was unclear how the contract was meant. On such moments the central team is also involved.

Right now one assignment for realisation is given, in the SAGO package. The price that is agreed for this part is equal to the target price. At SAGO there was a difference of opinions on two other points between the client and the contractor. Because it could not be settled easily, the Board of Experts was involved to deal with these discussions. One of these was the contradictory information about the quantities for certain types of asphalt (see also interview Dick Stoop). According to Rijkswaterstaat this was exactly the idea of the pricing risk: the contractor takes the risk of the assumptions that have to be done to make the target price (until 5%). Rijkswaterstaat was proved right in this case. The other case was about the responsibility of pipes and cables of third parties. The contractor did not read the contract well and found later that it was their responsibility, instead of the client’s. This hasn’t been changed. But the unreasonable requirement of dealing with some pipes and cables in an extreme short period (too short period) is shifted back to the client.

The provided information by the client in the tender phase could maybe be clearer and more compressed. That could have helped to reduce these issues. Nevertheless, the idea of the 5% range works in two ways, as well in advantage as in disadvantage of the contractor. In discussions you will only see the negative side.

This large amount of provided information in the tender phase is indeed in contrast to the limited amount of documents the contractor may produce. This might be done better. One could explain this from the practice to provide as many information as possible in D&C-contracts, where in the tender phase a
full design to derive the (fixed) price has to be made. The long history of the SAGO project makes that there is so much information available and thus that much information can be provided.

Not all this information might be necessary to provide. The current situation (information about the area) is something the client should indeed map out, but norms and guidelines to use in detailing the design might not be necessary. Rijkswaterstaat pulls risks back by providing so much information, especially by providing information so fragmentised. In that way it often happens information is contradictory.

Overall, it seems that things go quite well according to planning. That would mean the project objectives of the packages could be reached and the projects could be finished before May 2011.

On the other hand it can be seen that there is a tendency with contractors and maybe also contract managers to give in on quality, especially process quality, because of the time pressure. This leads to a less structured way of working; orders might already be placed while the design is not verified yet. This could in the end lead to higher failure costs. It seems that right now this is still in balance, i.e. quality is not suffering too much under the time pressure.

Most discussions yet to come are probably on the 5% arrangement: what falls within this range and what not? In other words: what were assumptions that need to be counted in this risk of the contractor and what are mistakes that need to be covered by the client? Discussions on this point are expected because this is the point where there is something to win: it determines the benefit of the contractor and it can be pinned to the quality of the work of the client. On the other hand this 5% arrangement reduces the amount of discussions as wins and losses neutralise each other.

**Context/project specificity**

Best Value Procurement can be used in all kind of projects. To contract a party that works for your interests is always a good idea. The pricing system based on quantities and with the 5% range for the contractor is really something that can only be used with simple projects with a lot of certainty at the start. In one of the packages there is a more complex part with a lot of solution space and uncertainty. Using the same approach will lead to high risks (pricing far too high or too low). One can already see that in that project more tension exists and more discussions are going. For such complex and uncertain works it might also be better if parties can outstand with their design and ideas.

The central team wanted to use ‘past performance’ as a selection criterion for the tender, but that approach was yet to complex for Rijkswaterstaat. Here the policy of Rijkswaterstaat worked restricting for this team.
What is difficult in the organisation of Rijkswaterstaat is that it exists out of many parts. The project teams are motivated to dedicate to the project objectives and the interest of the contractor, but there are other parts of the organisation which do not have that motivation and might even hinder the progress of the project.

Another restriction was the fact that Rijkswaterstaat has prescribed the way of working with risk management and that transferring the total risk file to the contractor is inconsistent with this approach. This point has led to some discussions.

The European tender regulations were restrictive in how was dealt with the client’s risks that were not recognised by the contractor. According to the Best Value Procurement it would be best to have the preferred bidder propose responses for these risks before awarding the contractor (as they are in competition, ‘pre-award phase’). If he cannot handle this, one can still select another contractor. This is not allowed in European legislation (this is bargaining), so this second step is done after contract award and thus not in competition.
Dick Stoop  
VolkerInfra A1/A6  
Spoedaanpak Amsterdam – ’t Gooi (SAGO)  
25-05-2010

**General information project**
See interview Rudie vd Wal for general information of the project.  
On the moment Dick Stoop was involved, almost all work for the tender was done. The prices are determined and the quality documents were ready.  
On that moment he could only read up on the project and prepare for the interviews that were coming. He also joined the last meeting in which the proposed prices are discussed.

**Preparation and tender phase**
For the tender the parties had to deliver a list of prices for the given quantities, a risk file, an opportunity file and a planning. Bidders were asked for dominant information, which means the bidders had to stick to the headlines of the project and not go into detail.

**Division responsibilities and risks**
In the short time Dick Stoop had before the tender, he could not get a clear view on which responsibilities and risks were transferred to the market. The tender manager should have had that clear view, as he is the one to decide about the bid.  
It seemed everyone (including especially the tender manager) had the idea that it was clear how the contract (including the division of responsibilities and risks) worked. Looking back, the question is whether that was really the case, as now in the realisation phase it turns out that some things are arranged differently than expected.

The deal in this contract around ‘client risks’ (see interview Rudie vd Wal) is clear and works very well. For the contractor it is a relatively new experience to focus so much on the client risks and less (only internally) on the technical risks.

For these client risks, the contractor is acting pro-actively. For example the permit for cutting down trees is arranged by the client, but the contractor tries to manage the risk of delay of the permit by hiring an ecologist. These costs are covered by the client from the risk fund.  
Before (in other projects), the contractor would just claim a delay of the completion date.  
The fact that there is a risk fund to pay these actions from and that the contractor shares in what is left of the fund, is a good motivation for the contractor to work on this.
Realisation phase

In the realisation it turned out that there were a lot of things unclear about the contract, partly caused by the provided information of the client.

One major problem in the realisation phase was the fact that provided information appeared to be interpretable in different ways. For example, during the information rounds in which questions of the bidders are answered, it seems some answers on these questions are interpreted differently by the client and by the contractor.

There were mistakes in the quantities, which had to be covered by the contractor. The contractor had confidence in these quantities. There would probably be some uncertainty around these quantities, but that is the risk he takes (within 5%). Now it turns out that there are big mistakes in the quantities also fall within this arrangement and thus are all costs for the contractor.

Of course, this uncertainty about what is in the contract (caused by the extensive amount of information and the high time pressure) can turn out positively and negatively, but it does not seem to be the most correct way to work.

An example of this are the provided quantities of porous asphalt (ZOAB) which correspond with the provided drawings, but somewhere else in the contract – which was not studied in detail during the tender phase because of time pressure – other locations where this asphalt was needed were described. These locations thus did not correspond with the quantities and the drawings, which led to a difference of 30% or 1.5 million euros. This turned out to be a debit for the contractor.

Another example of vagueness is the risks around pipes and cables of third parties. In the tender phase a whole batch of paper with information on pipes and cables was provided, full with plans and planning of activities. This was seen as if everything was arranged. But somewhere in this batch of paper there was one line stating that everything about pipes and cables has to be arranged by the contractor. Again, this information was not filtered from all other information (the whole batch of paper) during the demanding tender phase.

This example led to problems because only when making the design one finds out there is a problem with these pipes and cables and the time until the moment these pipes and cables are physically in the way of the project, is too short to get this work done. The lead times to move these pipes and cables should be known with the client too.

This problem is brought before the Board of Experts and they decided this was not correctly done by Rijkswaterstaat and thus the consequences are transferred back to Rijkswaterstaat.

For the contractor these issues are difficult to deal with, because – although it is the idea of the contract to determine the total building costs based on the design – they can not finish the design before there has to be decided on the
total building costs. There is just not enough time to finish the design before this moment. More over, because of the time pressure in the tender phase not all details of the contract are studied. It would be better when the provided information is clearer, for example by reducing the amount of information, and the client would also stick to the headlines in the tender phase. Besides, it could help a lot if there was no – or less – contradictory information. Finally it is necessary that the tasks transferred to the contractor are at least achievable.

**Context/project specificity**
Hans Kitslaar  
VolkerInfra A1/A6  
Spoedaanpak Amsterdam – ´t Gooi (SAGO)  
08-06-2010

**General information project**  
Hans Kitslaar was tender manager for this project. He was involved from the start of the tender phase, July 2009, until two months after the tender.

The project is steered on traffic hindrance.

See more information on the project in the interview with Rudie vd Wal.

**Preparation and tender phase**  
In the tender phase already a risk analysis is made for the risks relevant for the tender phase. These are mostly risks that influence time or money and hardly risks that are relevant for safety or stakeholders. This is a standard procedure. In this tender the client asked for a list of mitigations for risks (risk file), which would be scored in the MEAT-procedure. The same is for an opportunity file. These mitigations cost extra money, but give a virtual reduction on the bid price.  
These risks were in fact client risks which could be reduced by the contractor. These were mostly things dealing with traffic hindrance. By doing this, the contractor could reduce the worries of the client. In the end, the bid price still has a large influence on the award of the contract. The MEAT criteria did influence the result, but were not decisive.

The provided quantities were already in the tender phase adjusted by some comments of the bidders. After these adjustments one had the idea that the mistakes in the quantities would be within a range of 2%. Later it turned out there were even more mistakes in the quantities. In the tender phase an extensive discussion has taken place about these quantities and the risks that were with the 5% principle shifted towards the contractor. The client has explained it several times, but nobody did finally understand it. In the beginning also changes of scope fell within the 5%, but this is adjusted during the tender phase. In later fast-track projects this is taken back into the 5% principle. Hans Kitslaar thinks this is done to have all bidders take 5% extra in their bid into account and with that make in fact everything ‘cost plus’.

In the tender phase it was clear that there would not be enough time to do the design in the way it normally is done, but because of the urgency and time pressure in this project it seemed that it would be achievable. There was enough time to determine the necessary quantities.
Division responsibilities and risks

The division of responsibilities was generally very clear. In the tender phase no changes in this division have occurred. Just the degree in which the contractor could reduce the client’s risk was something that was discussed in the tender phase (by this risk and opportunity file).

The acquisition of permits was a responsibility with a lot of pressure on it, as there was very short time to realise this. But one way or the other, it had to be arranged, otherwise it would not be a fast-track project.

In general large amounts of risks are transferred to the market parties, sometimes more than they can bear. What often happens is that when requirements of the client turn out to be unreasonable (and thus result in high risks for the contractor), they are shifted back to the client.

The fact that some pipes and cables had to be relocated in a lead time that is unrealistic made this point to an unreasonable division of responsibilities, as in fact this work could not be realised. This problem was not discussed before contract closure, because the contractor did not see the lines saying that they were responsible for the pipes and cables. If they did read these lines, they would have asked questions on this topic.

The division of risk is in principle a good one, except for the fact that the method of pricing is incomprehensible. Hans Kitslaar thinks even today nobody understands how it really works or what is meant with it. It seems that in each fast-track project the explanation about the pricing is different.

A lot of risks are with the 5% principle transferred to the contractor. He has to take 5% buffer in its price into account, because the quantities are always 5% higher than stated in the first place. The idea of this principle was to jointly reduce the total of quantities, but this was impossible due to the lack of clarity in the quantities provided by the client. This lack of clarity is caused by inconsistency between provided written information, drawings and other sources of information. It all starts with the ignorance and negligence of the client.

If they in fact know nothing about the current state of the work and thus the needed quantities for this project, then they should have said that and make everything ‘cost plus’.

Now the client asked the contractor to trust his provided quantities and to base his bid on this provided information. The contractor thus will feel cheated on. Another option would be to give the bidders extra time to find out what the real quantities in the work are.

VolkerInfra did not take into account a full 5% buffer, because they trusted the provided quantities of the client. One can see in later fast-track projects that all parties add 5% to their price, because it seemed one needs that buffer to deal with the inconsistencies in the information. In this way the risk is transferred back to the client which now pays the price +5% in each situation.
In this division of risks and responsibilities it does not really seem there are things that could better be done/borne by the other party. What does matter is that when risks occur borne by the contractor he will get a penalty, while when risks occur borne by the client nothing happens. There is a large onus of proof with the contractor, which is often difficult to deal with. Even when the client makes a mistake or is too late with certain actions, it is the contractor that has to prove he is harmed by this. According to Hans Kitslaar penalties are too often used. They should only be used on the quality of the end product and not in cases where you do your best and it is still not strictly according the rules. This could in general, but also specifically in this project, be more flexible and more based on cooperation.

Realisation phase
The discussion about the pipes and cables seems to origin from the fact that one person decided to transfer that risk towards the contractor. According to Hans Kitslaar, in the contract it seemed that everything was arranged, but that one person had somewhere in one sentence written down that it should all be done by the contractor. This was only later found out. In general, the client should be clear about the responsibilities and not hide in the contract what is transferred to the contractor. This is the duty to warn of the client, which is also the case for the contractor.

As well with the pipes and cables as with the quantities one can see that the client does not seem to know how the current situation is and then shift all those risks towards the contractor. It will not end up in a big loss for the contractor, but one mainly feels not treated decently.

One could say that risks are created by the inconsistent and sloppy information.

Altogether the idea and the philosophy of the contract are clear, but the implementation created the problems. It is no problem that there is a lot of risk and responsibility with the contractor, but one should be clear and should communicate about it. The information you provide and communicate as a client should be correct and you should really stand behind that information. If you don’t know something for sure, you should not communicate it or you should bear or share the additional risks.

On this moment each week a report is made about the largest or most actual risks in the project. This report goes from the contractor to the client. For Hans Kitslaar it is unclear whether this has any effect, as he is no longer involved in the project. The client stays in this way more informed about the status of the project.
Context/project specificity
This approach for the traffic hindrance is suitable for such busy roads, which makes the interfaces complex. For projects with simple interfaces in terms of traffic another approach would be better suitable.

The short tender phase is only suitable because this project is not a new road, which means less planning procedures and regulations. In fact it is a quite simple project.

In each project MEAT criteria should be filled in differently. The client should even be able to listen to the market in making these criteria. In this project no solutions could be brought in, because of the short tender phase. In a long tender phase this might be possible. It should then even be possible to propose to close the road and execute the work in a very short time.

A good thing in this project was the rewarding for dealing with risks and opportunities. This could be used in more projects. In general, the use of MEAT is very good for awarding the contract. In this way one is stimulated to go one step further than the others.
General information project
A2 Hooggelegen is a realisation project of a small part of the A2 motorway between Amsterdam and Utrecht, on the north side of highway crossing Oudenrijn. It is the first project of Rijkswaterstaat which was tendered as an alliance contract.

Marco de Regt was involved in the plan study phase concerning the content of the project from end 1997. In 2004 he was asked to set up the pilot for tendering A2 Hooggelegen as an alliance. A contract manager was involved in 2006 who did the tender phase. Marco de Regt stayed involved, but now from an advising role. After the tender phase he became manager project control and later contract advisor within the alliance, which is still his role.

In the CAU-decision (corridor Amsterdam-Utrecht), 1995, already some exploration of the project was done. In that time there were no track decisions and alike procedures. In 1997 it was clear how many lanes the road should get, but not yet how the connections would be designed and how the integration in the surroundings would be done. These were points of discussion with the municipality, as they were planning a new housing area on the same place. The integration of the motorway and the new part of the city has cost a lot of time and study. This is done very carefully, because of the impact on the citizens. The result was a governance agreement about this problem signed in 2002 and for the specific Hooggelegen-part in 2007. Already in 2004 one has chosen for one variant, but this had to be worked out in further detail.

The physical realisation of the project is mostly steered on time, especially the first year, and later the focus was more on money. In the beginning some decisions are made that resulted in fast realisation, but that cost more, and now there is some more room in the planning so the focus can be adjusted towards money. Later is explained how this is translated in the contract.

Preparation and tender phase
The idea of this project was to tender it as an alliance contract. This was based on the idea of Rijkswaterstaat to develop a new approach of the market. A2 Hooggelegen was a pilot project for this approach. A study was done on other alliances, such as the Betuweroute, but that were projects tendered as a D&C-contract. A2 Hooggelegen used an alliance contract already in the tender phase. The decision to use an alliance contract is made in 2004 and was initialized on the idea of a director, who had heard about some good experiences with alliances from abroad. Parallel to that was the advice of the parliamentary inquiry committee, who stated that it would be a good idea to start some pilots.
with alternative forms of organisation. Hooggelegen was chosen as a pilot because it is a complex project in the sense that it is a very busy road, which gives very little margin to organise the realisation of the project, together with the development of the housing area and the high time pressure that was on the project. There were no grounded reasons why a complex project was chosen as a pilot for the alliance. A policy decision model did not exist yet.

The tender phase started at November the 30\(^{th}\) 2006, when there was not yet a governance agreement. This was done parallel to the tender phase.

One has tried to keep the results of the plan study phase as much as possible free from solutions (to be able to have some solution space for the contractor), but that was difficult as the negotiations with the municipality went into quite a detail. Around the year 2000 there was even a complete design, because in that time one was used to tender projects with complete specifications (traditionally). This design is used during the tender phase, which was a competitive dialogue procedure, as a reference design with the mean to reduce the work for the bidders in this tender phase.

The motivation for the contractor to steer on time and money (see above) is realised by six ‘critical factors of success’ that all are coupled to bonuses (and penalties). These factors are in hierarchical order: minimising traffic hindrance, traffic safety, time, quality, image and budget. The bidders could propose a bonus structure for each of these factors during the tender phase.

Looking back it might be better to have fewer factors.

In this project is decided explicitly not to use the ‘listed risks’ system, because the client thought the risks that could be used as listed risk were difficult to price and that such a procedure would make the tender phase even more intensive.

During the tender phase there has been discussion on risks, but that was more about what risks the parties see in the project.

In the tender phase the bidders could also indicate whether they wanted to share the costs, when they rise above the budget ceiling, or that they wanted to have the costs capped on a certain level. This point was taken into account in the MEAT-procedure.

**Division responsibilities and risks**

When was decided that it should be an alliance contract, the first idea was to start an independent company in which client and contractor are organised. That company would then be responsible for every part of the project: from plan study until realisation.

This turned out to be very difficult to organise, because of the Governments Accounts Act (comptabiliteitswet). If one wanted to realise this company it had to be decided by the First and Second Chamber, which is quite an extensive procedure.
The plan changed into an alliance besides a client and a contractor. The client and the contractor together close a contract and deliver people to the alliance. The alliance is responsible for every part of the project, but is no legal entity, which means that in the first place the contractor pays for everything and then shares it with the client.

In other words: the contractor is responsible for everything but will be helped by the client and in the end the client and contractor share the costs, except for the realisation costs.

There are some exceptions on the statement that the alliance does ‘everything’: planning procedure (such as changes in the land-use plan), acquisition of land, traffic management (such as de-icing and incident management), communication and the payments. This list is exhaustive.

Directly from the beginning there was clarity about this list of exceptions.

In the contract no maintenance or finance is included, because this was not relevant for this project.

The division between client and contractor/alliance is still quite clear according to Marco de Regt.

For the allocation of risks, the following was decided: everything is with the alliance, except the realisation risks – which are with the contractor –, Acts of God, changes of scope and changes of rules and regulations – which are with the client – and furthermore some risks are capped.

The alliance is responsible for managing all risks, but when an event occurs the contractor will pay the consequences that result from the event. In the end the client will pay half of what is extra above budget or wins half of what is under budget, except for the costs resulting from realisation risks and the client risks, mentioned above.

The alliance is steering the building contractor (the part of the contractor that does the execution of the work) which is formed purely out of people from the contractor. This building contractor gets packages of work, all with its own price. Execution risks are in that way transferred to the contractor solely.

As already stated, some risks are capped. These are risks that are not knowable from the given information (such as archaeological findings, contamination of the soil, etc.) and risks that are caused by lack of cooperation of public authority. This means the risks are in the basis with the alliance or the contractor, so when the event (of that risk) occurs the alliance/contractor has to pay. But, when everything is done to manage the risk the best possible, the alliance/contractor only have to bear the consequences to a certain level.

At this point looking back the alliance contract seems suitable for the project, but one cannot say whether it is more or less suitable than other approaches, because this is not investigated. Marco de Regt thinks this approach is slightly better than a D&C-contract, because it can be seen now that the results score
quite well on certain (in the contract stated) ‘success factors’. Besides, there have been no juridical confrontations until now, which can be seen as a contribution of the alliance approach.

There was the idea to involve the municipality in the alliance, because of the interwoven situation, but the municipality itself did not want to join the alliance. They thought their civil service was not capable enough to deal with such project. It could have helped to have the municipality in the alliance to increase the pace of some processes.

The alliance in fact had no authority (as it was no legal entity), so when things need to be arranged with stakeholders (for example about changes of scope), it should be done via Rijkswaterstaat. The responsible stakeholder manager is someone of Rijkswaterstaat. Often this is arranged directly, but officially a scope change goes from the alliance to the contractor, to the client, to the stakeholders.

In the tender phase no adjustments of the division of responsibilities or risks have occurred. There was a possibility for the bidders to decide about the division of responsibilities between the alliance and the building contractor: does the alliance make the design or the contractor? This is in fact quite an essential decision, as the design responsibility and its risks could on that moment be transferred to the contractor or not.

The selected contractor had a division in which the design was with the alliance, which means a traditional relation with the building contractor was established. According to Marco de Regt it might be nice to have this division less traditional.

Looking back it would be better to choose for a division on beforehand, so that it would be clearer to everyone how this was organised.

It would also be better to discuss the filling of the positions in the alliance team in the dialogue phase. Now, Rijkswaterstaat has done the filling one-sided and there was no involvement of the contractor here.

**Realisation phase**

Vagueness of the risk allocation has mostly been on the framework: the given specifications and the uncertainty around the given information (for example differences between information in text and in figures). This is caused by the time pressure before contract closure, which led to not checking all information on consistency.

One could say that the client draws a lot of risks towards him by giving all this information, which apparently has a lot of uncertainties, but it was the goal to have all bidders not invest a lot in making a design and therefore giving all the information he has.
The alliance has to realise the project with this information. They handle with the idea ‘best of project’, which means they need to be flexible with small errors in the information and solve it in such a way that it will not harm the project. When there are big mistakes in the framework (given information) compensation by the client has to be made. This is done by an adjustment of the contract. An example is a pumping station what seemed to fit under the new designed cross-over. In practice the given information about this part appeared to be inaccurate, leading to the relocation of the pumping station. The client will pay compensation for the costs of relocating this pumping station. For each of these errors or lacks in the given information is considered individually who has to bear the consequences. Overall, the amount of binding information is not very much.

Looking back, the provided information is of all kinds of levels: some parts were already researched by Rijkswaterstaat, some things were researched by external parties (of which the advice often is not acceptable) and all this information you have, you want to share. But this bulk of information is sometimes contradictory and needs rewriting. For this step not enough time was available.

In the beginning it has been a search to find out what the responsibility was of the design team of the alliance. This has led to a lot of discussions, but not to any problems. The cause of this discussion was the fact that the decision about the division of responsibilities was given free to the bidders and was subsequently not clearly written down in the contract. The discussions led to more clarity, not to any adaptations. Still, discussions remain about what is a design risk and what is an execution risk.

When unexpected events occur, the alliance first looks for solutions to keep the effects minimal, before discussing whose problems it is and who has to pay. The agreements in the contract were sufficient to find out who is responsible, but it turned out that a lot of effort had to be put into the explanation of the idea of the contract, for example to sub-contractors. The philosophy of the alliance approach was not clear from the beginning for all involved people. This problem also occurred on the moment tender people were replaced by execution people, which means a lot of new people have to understand the contract philosophy of the project.

All this effort to gain more clarity for all participants (as well about the general idea of an alliance as for example the clarity about the design responsibility) could be pulled to the front-end of the process by having a more clear division at the start of the tender phase. This was not done, because of time pressure. There was a strong will to tender in 2007, which caused this time pressure. This date was deducted from the general agreement between Rijkswaterstaat and the market that all works on the A2 would be finished in the end 2010.
The question is whether more effort at the front-end of the process would result in a better contract. There has been some effort in market consultations, some time before the tender, but these meetings are often very general and with other people than the people on a project. These consultations were useful, one thought, but did not go into detail, which is exactly the place where the problem of the misunderstanding starts (in the details).

**Context/project specificity**
For this project the contract is tailor-made, so no standard agreements are used.

This approach (an alliance) for the project is only viable when there is really a challenge, something to win in the project. In such projects you really need both parties to solve the problem: because of time pressure, difficult stakeholders, state-of-the-art techniques, etc. Only by deriving synergy such projects can be a success. This can be seen in this project: a lot of reduction in time is derived by combining the capabilities of both parties. For less difficult projects more standard approaches are sufficient instead of an alliance. The same is for projects with a maintain component, as it is not wise to have an alliance for thirty years.

The policy of Rijkswaterstaat to keep the responsibility for public communication with the client works restrictive for this project, as the alliance would be better capable of doing that job. Now a strange construction is used to do this anyway: Rijkswaterstaat is hiring someone from the alliance to do the public communication. Another restriction from the organisation of Rijkswaterstaat was the fact that a limited amount of employees were available for the project, which meant that the idea of “together forming the alliance” was restricted as more people from the contractor side were needed to fill the organisation.
Eddy van Haastregt  
Trajectum Novum  
A2 Hooggelegen  
09-06-2010

General information project
A2 Hooggelegen is an alliance project. This is the first time in infrastructure that a project was tendered as an alliance. (For more information see interview Marco de Regt) Eddy van Haastregt was responsible for the tender phase within Trajectum Novum, which is the contracting combination for this project.

Preparation and tender phase
The tender was split into two phases; one for the plan of action and the other for the bid. No design was made in this tender. The goal was to make a budget based on some general information. After the award of the contract, the alliance management team was formed. Eddy van Haastregt was one of the members of the team, which was formed by three people of Rijkswaterstaat (including Marco de Regt) and two people from Trajectum Novum. Eddy van Haastregt filled in the role of contract manager. Normally he only does the tender phase and a short period after contract award to guide the transition towards the realisation, but now he is involved for the whole realisation. This is because the tender partly consisted of a workshop in which the management team was tested on teamwork competence. The people that joined the workshop were expected to stay in the project during the realisation.

The project is mostly steered on time. In this project time is the connecting thread of all decisions and actions. The contract gave six factors of success, of which the first two are time and traffic hindrance. The advantage of time as a factor of success is that it is well quantifiable. For traffic hindrance this is more difficult, as one can always wonder whether the hindrance is caused by the work or by something else. These two factors often weigh the same. When a trade-off has to be made between time and money, time always wins. This is based on the idea: if you keep your promises about the milestones in time, the money will show up one day, but if your time schedule will get out of hand, your budget will too. This works quite well in this project and resulted in large wins in time.

The fact that no design had to be made in the tender phase was an advantage from the point of view of the stakeholders, because the contractor could take into account all kind of wishes as it had not yet dig its heels into one solution.

In the tender large amounts of information were provided by the client. The bidders received 8 CD-ROMS with information and kept receiving new
information while making plans. This meant plans had to be changed all the time. It was often unclear why certain information is provided. Within the organisation of the contractor this was a large operation with reading schedules, making summaries and trying to have an integral picture of the situation. This last point is hardly realisable within the tender time, which creates enormous amount of risks. You cannot be sure to have a full integral picture of the situation, which means in fact that you cannot do a firm bid. This leads later in the project to difficult discussions, because the contractor did have the documents but did not get all the information out of it. Of all this information only a small part is binding. Nevertheless, it is expected that exploratory (non-binding) information is also taken into account. And it is hard to tell what to take into account when the exploratory information is contradictory.

Two things that can happen due to large amounts of information are contradictory information (see following example about portals) and overlooked information (see following example about decontamination). By providing a lot of documents with (partly) the same information inconsistencies arose. There was different information available about the interface with the tunnel contractor. The pricing during the tender was based on a drawing that showed portals that had to be delivered by the tunnel contractor, while in interface drawings (also part of the contract) it turned out that the alliance had to deliver those portals. This resulted in a deficit of one million euros. First was decided to have this risk borne by the alliance, but now again discussion has started about it.

Too much information can also make that things will be overlooked. In the provided information researches to soil contamination were included. According to the contractor, in the piles of information a summary was hidden, which was not recognisable as such and which referred to documents that were not included. This summary was overlooked during the tender and this resulted in a wrong estimation of the costs for decontamination. The resulting costs are borne by the alliance.

It would be better when it is clear why certain information is relevant and communicate more open about each other’s interests and fears. By communicating openly it becomes clear where the problems in the project are. Another option is to have the client only provide the binding information and have the exploratory information available when asked for. Either will not happen as long as there is a lack of trust between the parties and one is afraid of being misused.

**Division responsibilities and risks**

Already in the conceptual contract the division of risks and responsibilities is laid down. One can think of planning procedures, unexploded explosive ordnance (UXO), Acts of God, etcetera with the client, realisation risks with the contractor and ‘the rest’ with the alliance.
This seems very clear, but going more into detail this division becomes vague again. What is exactly a realisation risk?
For example, there was a situation with a bridge that needed maintenance. In such operation the weather normally is a realisation risk. To deal with this, it was necessary that the whole bridge would be packed into some sort of foil. But by doing this, a new risk was created. When high winds would occur, the bridge could become unstable. That means the bridge needed to be – partly – unpacked in cases of high wind and later again packed, which would lead to delays. If this is fully a realisation risk, the contractor would look for other approaches, which would probably be more expensive. This makes the project much more expensive, only because the risk lies with one party.
Now, by sharing this (by making the decision to do it this way, taking into account that risk) these costs are reduced.
These types of discussions about details are all held after contract closure.

During the tender phase also some discussions and adjustments have occurred. An example is the requirement of the client to have a guarantee on the work of ten years. For the contractor this was unrealistic because parts of the project, such as layers of asphalt, will need maintenance within ten years, but maintenance work was not possible within the contract. There has been a lot of discussion about this issue. Finally the specialists of the client agreed that the requirements were not realistic and the guarantee for these specific asphalt layers is brought back to seven years.
There is still discussion about whether or not the price has to be adjusted because of this adjustment.

In the tender there is a dialogue phase to discuss such things, but it seems that often there is no room to adjust the contract. This is especially the case for unrealistic requirements, such as these guarantee requirements, and discussions about capping the risks for the contractor.
For this project, nothing dealing with risk allocation has changed during the tender phase. (Except for some refining on the guarantee arrangement; now a distinction is made between maintenance caused by a mistake in the design and maintenance caused by a mistake in the realisation. This was not how the contractor wanted it, especially because the contract states that repairs will be made by the client or third parties, and he thinks this arrangement will lead to many discussions.) The contractor expected that there would be room to adjust some things, because specific dialogue products were planned to do so, but during the second tender phase some things changed and there was no room for discussing risk allocation anymore. In this project, the contractor would have liked to discuss the refining of the risks on the division between client and alliance and especially between alliance and building contractor. Exactly this last point turned out to be a discussion point in the realisation.
The contractor did still bid for this project, and kept in mind that unrealistic requirements can later on be discussed and then will still end up with the client. This creates in fact a risk for as well the client and the contractor. The contrac-
tor relies here often on the principles of ‘reasonableness and fairness’ (redelijkheid en billijkheid).

Because contract awards are still for a large part based on the price (there is a MEAT-procedure, but the differences in quality on those scores are not always very large), the drive remains to reduce the costs on risks, which means one keeps trying to push the risks away. This makes the approach of contractors opportunistic, as they are trying to shift risks back to the client.

A problem remains that there is not enough idea of the drives and reasons of the other party to take certain decisions. The dialogues during the tender do not always help to get a better view. Discussing each others interests and fears is not a common part of the dialogue phase. Sometimes this is caused by the fact that nobody thinks about it and nobody asks for it and sometimes this is caused by the fact that parties will not give such information and are afraid that information will be abused by the other party. This is cause by a lack of trust between the parties.

Looking back on this division of risks and responsibilities, Eddy van Haastregt would choose for another division between the alliance and the building contractor. Although it is less beneficial for the contractor he would shift more responsibilities to the building contractor, because this will relax the discussions with the client and make the cooperation even better. Bearing risks makes a party sharp in discussions and making decisions. In that way the building contractor would be more involved with the result.

Another thing that he would do differently is the indexation of the prices. These are now coupled to something else (general governmental prices) than usual (combination of material prices), which makes the result of the contractor vulnerable. The project organisation of the client has in this way transferred the indexation risk away, as their budget indeed is coupled to those governmental indexation. The contractor has worked his way out of this by explicitly putting this risk within the alliance (thus not the building contractor), but this is a precarious decision.

It would be better to have a discussion about this.

A standardised division of responsibilities and risks should be a starting point in the tender phase, according to Eddy van Haastregt, but there should always be room for discussion and adjustments. An optimal risk allocation can only be found when both parties are involved and show their fears and interests and the allocation is made project specific.

This latter point is important, because it seems the client sometimes wants to hide project specific risks by not mentioning them explicitly. Later it turns out that following general conditions the risk is allocated to the contractor, but it would be better, according to Eddy van Haastregt, if the client would make notice of the risk existing. The same goes for the contractor.
Realisation phase

The cooperation between client and contractor was different in this project. Normally, all changes in the work compared to the contract lead to discussions in the realisation phase. This is needed for the contractor to make sure he is still able to make his cheapest solution, or he will get more money for another solution.

Now, the alliance takes the decision, based on ‘best for project’, which might cost some more, but is better for the project and they know that in the end things will be arranged. The trust that this will work is based on the fact that people of the client are in the alliance and joined the decision making. It was not easy to work on the basis of trust and equality, especially on the stressful moments, but in the end it worked out better.

In this project one can see that by involving both parties in the management team there is more feeling with the interests of both parties. By taking into account the interest of the other party one creates trust and the other party will be more confident that later in the project its interest will also be taken into account. In that way one cannot create only benefit for himself, but also for the other party. When there is no trust, parties will try to create maximum benefit at the cost of the benefit of the other party.

See the figure below.

The same counts for the cooperation with other stakeholders. Right now, Trajectum Novum has realised an extreme planning, but encounters the problems of another project. A2 Hooggelegen connects to a tunnel which is now delayed. This means the added value of A2 Hooggelegen finishing so early, is fully diminished because of the delay of the other project. Therefore Trajectum Novum now tries to help the client to solve this problem, although this work is outside the project boundaries. In that way they try to combine the interests of all the different parties. This needs a lot of cooperation, which is especially difficult when image is at stake.

The fact that not everything is discussed during the tender phase led to problems during the realisation. For example the division of responsibilities...
between the alliance and the building contractor has caused lot of discussions, because it was not clearly discussed beforehand. This led to delays and also had some impact on the trust between the parties.
The same goes for some other details in the contract. Because there was no room for discussion, details remained unclear and led to arguing later in the project.
One has to realise at this point that there is only short time in the dialogue phase and that during the dialogues only the main risks, seen from both perspectives, can be discussed.

**Context/project specificity**
For a good allocation of risks it is important that parties need to dedicate themselves to each other’s risks. That does not necessarily need to be in an alliance, this can also be in other ways, but it needs a lot of cooperation. This is based on culture and behaviour of the parties and can be enforced by mechanisms such as bonus structures. Still, a bonus needs to remain a means to an end.

Specific in this project was the time pressure, the focus on traffic hindrance and the fact that one worked in an alliance.
Time was always leading in decision making. This also means that one chooses for a robust design to be able to start earlier. Because in the tender a less robust design is used for pricing, this sometimes leads to budgetary problems.
The same is for the traffic hindrance. A large bonus would be awarded if traffic hindrance was reduced. To realise this, extraordinary measures had to be taken. This was also not taken into account in the tender and thus the pricing.
Risks were limited by working in an alliance. Both parties were involved in the alliance, which means risks were in an early stadium discussed with both parties and thus did not have to escalate. Besides, both parties could use their expertise to solve the problem which led to original solutions.

The solution space in this project was large, but the complexity in the interfaces (including the stakeholders) was too. This means a lot of things were already arranged. This reduced the solution space.

The project was technically not very complex. Complexity could be found in the interfaces. If you change one thing, on three other points things change too. This enlarges the consequences of the risks.

At the start it was uncertain what the rights of the alliance were and the responsibilities of the building contractor. It took some time to get a clear view on these points.

An alliance approach needs a lot of energy and ‘good behaviour’ for both parties. It is therefore better to do this only in complex projects.
General information project
Frank van der Hell is contract leader and ‘Directie UAV’ for the ARK project. He was mostly involved after contract closure. Jeanis Lam is risk manager for this project and was mostly involved in the preparation phase.

The project is aimed to bring the canal to the right depth. It was contracted as an E&C (Engineering and Construct) under the UAV conditions. The project is steered on interfaces and stakeholders: all parties that had questions or wanted something of the project all have had their chance to propose this. The project organisation tried to take everything in account. Also communicating with all stakeholders belongs here. To a certain extent this has won of time and money in decision-making.

Preparation and tender phase
End 2008 Jeanis Lam was involved. On that moment the project had a scope, the means (time, money and people) and a procurement organisation, but there was not yet a contract or even market parties involved. He was involved in the procurement ‘sessions’ in which was discussed how the project should be put in the market. This is done by looking what the largest risks in this project are and how those can best be allocated between the parties. Decisions were based on 1) “market, unless…”-approach of Rijkswaterstaat and 2) cost-benefit consideration.

Time and energy is invested in this step to come to a good result. There were a lot of uncertainties: whether and to what extent the spoil was polluted, what the contractor would wanted to do with the spoil, how much spoil needed to be dredged as this information was based on very old sounding data, what the current profiles of the canal were and how the market would react on the “market, unless…”-approach of Rijkswaterstaat.

In these sessions was researched what the effect would be if Rijkswaterstaat took some risks itself, like the uncertainty about the quality of the spoil by doing an investigation to contaminated sediment. But each transfer of risks creates new risks, which means some steps of refinement needed to be done to come to the best result. This series of sessions was compact and intensive. The fact that during these sessions one worked on a high abstraction level has helped to finish this in a short period. Normally Rijkswaterstaat already engineers a lot of the work in the preparation phase, but now one remained with functional specifications.

This resulted in an assignment which stated only the required profile and not the current situation (only exploratory, not binding) and the exact work that has to be done. The risks around the quantities to be dredged and the slope of the...
bank were transferred to the market. This latter was point of discussion in the information rounds in the tender. This led to an adjustment of the exploratory quantities, but the risk remained with the market.

What is important for this discussion is the fact that the bidders need to base their price on something. If no information was provided, all bidders would do their own sounding, which would lead to high transaction costs. The bidders do not get a design fee for the work they do in the tender phase. For the risk around the quality of the spoil, another solution was found. An indication was made of the quantities of the different categories of spoil (based on a classification in “Wet bodembescherming”). These quantities needed to be priced by the bidders independent of the general bid. Also variations on these quantities needed to be priced, which led to five levels (-20%, -10%, 0%, +10%, +20%). When in the realisation it turns out the quantities vary there is thus already a price (in competition) decided. The result is that the risk is reduced and is spread over the parties. In the realisation it turned out that some variations were even larger than anticipated for in the contract. This needed to be bargained in the realisation phase.

As said before, each response brings new risks. Using this method created a discussion about the method of measuring. The depot where the spoil needed to be disposed was pointed by Rijkswaterstaat, as they can dispose spoil cheaper. Such depot has its requirements for the quality of the spoil which determines the price one gets for the spoil and which was used for the division of the categories. Nevertheless, the contractor had found a different interpretation of requirements of that same depot which was the basis for a new discussion. For Rijkswaterstaat the arguments of the contractor seemed illogical and created the feeling the contractor was aiming for a commercial win. Rijkswaterstaat had the idea they dealt quite well with this risk, but that thus turned out differently.

In the preparation or the tender phase no real changes of the division of risks and responsibilities have taken place. Some critical questions from market parties have been asked, but this have not led to any changes. On the other hand there were some additions to the contract of things that were not foreseen or things that were added to the scope.

**Division responsibilities and risks**

There was a lot of responsibility with the market, such as the investigation of contaminated sediment. This research was the starting point for the permit requests (which also had to be done by the contractor) and the basis for the definite pricing. Because the effect of this research was very big, it was important this was done in a good way. That means one gives the market a lot of freedom. The contractor was also responsible for the traffic support. This was important because this canal is a very heavily used route for large ships.
To transfer this responsibility led to large discussions within Rijkswaterstaat, because this was something what has always been done by Rijkswaterstaat itself. Such discussions are also fed by the idea of employees losing their own job. The contractor dealt with it in a very good way, which made it a success. They even took the responsibility of public communication over from Rijkswaterstaat by initiating a website with traffic information. This is contradictory to the policy of Rijkswaterstaat. Again, this led to discussions internally. In spite of this discussion, the contractor, Boskalis, won a Rijkswaterstaat award for their behaviour in this project.

The advantage of having the contractor do this communication is that everything is up to date, which is essential for communication about traffic hindrance. The client did emphasise that it should be an informative site and no promotion.

Rijkswaterstaat had hardly any responsibilities outside of course the responsibility for some control (checking the contractor), contract management and the payments. There were some issues about the unexploded explosive ordnance (UXO), which is also the responsibility of the client. This is explained below. Maintenance lies outside the scope of this project, as it is part of the work of Rijkswaterstaat itself and there were no reasons to deviate from that.

Another responsibility of the client is removal of physical contamination, such as bicycles. They have a long term contract with another contractor for the removal of these objects. The deal was that they would scan each section of the canal before the dredging contractor would do the dredging of that section. This was done quite well, although some tension arose between the working pace of the dredging contractor and the official response time of the other contractor. Such interfaces with other contracts and its risks need to be managed by Rijkswaterstaat.

This became stressful in the situation where dredging needed to be done under a bridge, which was at the same time maintained. For this maintenance a cradle (Dutch: hangbrug) was needed. This means it is not possible to have at the same time a dredger at the other side of the bridge, as in that case no ships can pass anymore. The client stimulated the contractor to try to arrange this with the other party amongst each other and this worked very well.

In this work one had to take into account the Flora and Fauna Act. Normally it would be a responsibility for the client to arrange the exemptions and deal with the rules. This time there was the possibility to have a permanent exemption if you have a certain code of conduct. This code of conduct is made by the client and the contractor was asked to incorporate the code of conduct in their quality plan. Later it turned out that this resulted in all kinds of requirements for the contractor of which nobody knew how to measure it. The client and contractor have together developed a way of measuring the quality.
The risks related to the work that has to be done were clearly divided, but the coordination in terms of time is something that needs to be done in good cooperation.

An example is the effect of another work in a lock further on. This is of great effect on the transportation time for the contractor, which is a risk that lies with him, but this does not mean the client cannot inform the contractor on this. The client has given all information on such issues he has got to the contractor. The large amount of information has hardly led to any problems, as there were hardly any contradictions in it. When such situation occurred, it was just a matter of finding out what the right information is.

In this project there was great trust in each other leading to dedication towards the risks that influence each other’s interests (such as traffic hindrance). There were no bonus arrangements, only penalties. Motivation was tried to create by taking these aspects into account in the MEAT-procedure. Looking back it might be better to have some bonuses. Frank van der Hell thinks it would be better to reduce the price a contractor bids with the amount he wins with the MEAT-criteria and give that money back when he indeed delivers the work promised with the scoring on the criteria.

For the traffic support the contractor hired former Rijkswaterstaat people that have the necessary knowledge for this work and who are known with the interest of Rijkswaterstaat.

Jeanis Lam and Frank van der Hell have the idea that the division of responsibilities was very clear (almost everything with the contractor), that risks lie with the right party and that this division worked out very well. Because there is a great part of the work with the contractor, he feels responsible to pick up the work and get started.

In general, everything that is needed to get to the prescribed end situation lies with the contractor. Only if something happens that reasonably cannot be asked from the contractor (alone) the client will interfere and take back or share the consequences.

**Realisation phase**

At the start of the project, before tendering, was said there would be no problems with UXO as there had been dredging activities in the 1970s until the same depth as in this project. Later it turned out nothing was to be found in the archives on these activities. This meant there was no proof that things were safe, which meant one had to take into account the possibility of things being unsafe. Rijkswaterstaat hired a company to do desk research on UXO. This resulted in eight suspicious locations. In those locations another company did the detection of objects with radar, which is inspected by an expert. This led to a result of 466 objects that could be dangerous. This means a large impact on the project. One could then follow a few scenarios. The first is doing nothing on these locations (‘avoid’ risk). This means the project objectives would not at all be reached. Secondly, one could approach all objects with divers (‘reduce’
risk). This would be a very costly approach. The third option was to remove only the objects that lie within the spoil that had to be dredged. For this option the contractor was asked to develop a method in which he can work with this option, by which he would ‘walk’ safe through the mine field. The contractor did a bid for this work and this turned out to be the best variant. (‘transfer’ risk)

The contractor took over a responsibility from the client here. This means all consequences of this extra work are also transferred to the contractor (such as delays or extra costs outside the sum for the extra work), unless UXO is found because then all other procedures start and this is outside the influence of the contractor.

For such deals a good cooperation is essential. This is based on the mind set of the contractor, of the client and the communication between the parties. As a client, one should not be too rigid with money. To get the work done, you should not pay too much, but neither too little.

To create a good cooperation and communication time and energy is invested to organise some meetings in which people of both parties get to know each other.

Unfortunately, this cooperation is to a large amount determined by the people involved and this cannot be steered by a contract or even a selection criterion.

Some help the other way around has also been the case. It is not usual to have the contractor arrange all the necessary permits. This resulted in difficult cooperation with the authorities, who are distrustful towards market parties. When the procedures became critical the client helped the contractor by joining him in the contact with these authorities to gain a trustful relation. Again cooperation speeded up the process.

So generally, the division of responsibilities is clear and works quite well, but when problems occur the best solution is in cooperation.

There are also situations for which the contract did not foresee. Such as sections with large amounts of tyres or unregistered bed protection. These sections were taken out of the contract during the realisation phase. These issues all arise from the fact that the operator does not have accurate information on his assets.

The discussions that took place in the realisation phase about the allocation of risks or responsibilities were mostly dealt with together. This can be done more easily because of both parties the management was supportive in making the project a success and gave the project teams the freedom to work.

Most issues were foreseen, but wrongly estimated (such as UXOs or the quantities of the spoil). These are in fact unknown unknowns and were all dealt with by good cooperation.
Context/project specificity
The same approach of this contract is also used with other works, which was certainly not a success. These works do not really differ on context variables. How the differences can be explained is unclear. This project is large, but not complex.
General information project
This work had a very long planning period (preparation of the work after award) of half a year to a year. Thijs Woolderink was involved halfway this period, in October 2008. His function was project manager.

The project was not steered on money, but more on time. Also the stakeholders have had an important role.

Preparation and tender phase
Thijs Woolderink was not involved in the tender phase. He has the idea no large discussions on the division of risks and responsibilities have taken place in the tender phase.
Already in the tender phase a risk analysis is made. This analysis is done on regular base during the whole project.

The award was partly based on MEAT-criteria. The general opinion of Thijs Woolderink on these criteria is that the principle is very good, but that it is not executed consequently. Often contractors score high on the criteria and fail to deliver that value in the realisation. Most of the time such contractor is not fined (punished) for that behaviour by the client. One could hand in a ridiculous plan which would score high on the MEAT-criteria and deliver none of the promised value and still feel no consequences.
It would be better to couple such criteria on an awarding system.
Another thing that would be better is a combination of past performance with the MEAT-system.

In this contract were only penalties, no bonuses. In general, Thijs Woolderink states, that a contractor would be more motivated by a bonus than by a penalty. Penalties are often taken into account, while a bonus is something extra on the work. For example with safety, if an incident happens and there is a penalty on it, the contractor would try to get out of it somehow. While if there would be a bonus on it, he would try as hard as possible to prevent incidents from happening.

Division responsibilities and risks
The way the contract was constructed was quite complex, according to Thijs Woolderink, and it was necessary to invest some time in understanding the contract. It was not necessarily difficult, but mostly complex.

The division of responsibilities was quite good according to Thijs Woolderink.
A great part of the work (almost everything) was with the contractor, which is
a good thing. Being responsible for a lot of work also means one can more easily steer and control the work. Also for Rijkswaterstaat this was a good thing, as their worries were taken away. This is only possible when both parties keep communicating and the client is able to test the work of the contractor on some essential aspects. In that way they have the feeling everything is still in control.

This is important for both parties. For the contractor because he can enlarge the trust the client has in him and for the client because he knows ‘things will be fine’.

There has been a meeting between client and contractor in which both have expressed their largest fears (the risks they see) and their interest in this project. This gave a clear view for the contractor.

The client showed he was afraid for collisions which would lead to obstruction of the waterway, problems in the contact with stakeholders and image damage. The contractor has concluded that they should take action on these aspects, in order to be able to relieve the stress with the client. Therefore the contractor decided to arrange continuous traffic support, which was not obligatory. This costs of course money, but also delivers a lot of value and will in the end pay itself back.

Another action was the development of a project website with information about the work to communicate to the users of the canal. They could in that way see where one was working on the project.

With these actions the contractor won a price (Rijkswaterstaat award) for ‘attitude and behaviour’.

The fact that the contractor did the communication towards the end users of the canal is remarkable, because the policy of Rijkswaterstaat states that public communication always stays with Rijkswaterstaat. Therefore the website had to be removed directly after the work was finished.

The contractor wanted to do the public communication to make sure everything was up-to-date. The client could not guarantee to have all information on the site directly (their reaction time could only be three weeks), while the contractor could keep the information constantly up-to-date.

Altogether Thijs Woolderink thinks in this project this is a responsibility that could better be with the contractor. He understands the reasons why Rijkswaterstaat wants to organise things centrally and thinks that this is possible, but only if Rijkswaterstaat will invest on a more up-to-date working method.

Also the contractor did express its fears and interests. Their biggest fear then was also collisions, image damage and a lot of delay caused by the rising water level at the dumping area.

Image damage was also internally an issue for this project. The management of the company rather made a positive image in this project than a large profit.
This makes a large difference for the mindset of the project team. The client has helped the contractor in this. They organised a lot of positive attention for this project.

This can also be seen in the result: a lot of positive attention has been for this project and specifically for the contractor, but for him the project was only profitable because of some extra work that was added to the contract.

The low profitability was partly caused by a mistake in the bid, which made Boskalis one of the cheapest bidders. They communicated this mistake with the client, just to be clear about it. One can see that this results in sympathy of the client.

The client has helped the contractor in the process of permits. Some legislation was changed, but the authorities did not accept this yet. On that point the client joined the contractor in this discussion, which led to a good solution. This was a flexible solution for a difficult situation.

A transfer of responsibilities has taken place with the UXOs (Dutch: NGE). The client was responsible for this, but because this didn’t work out well, he asked the contractor to take over this work. The contractor made a clear offer for this work and this was accepted by the client. This was one of the extra parts that made the work profitable for the contractor.

Still, if UXO would be found the consequences would be with the client. The motivation for the contractor to work on this issue was based on image and returns, but also on the will to gain knowledge and experience on that field of work. To help the client here or not is a deliberate decision made internally at the contractor.

Both examples show that the parties can help each other by solving problems, which led to a better result for the project. This was only possible because of the good cooperation between the parties. Thijs Woolderink thinks this was based on the support both parties got from their superiors to come to a good result.

If in another project the focus for the contractor is solely on the benefit, things would not be completely the same. It would be best to still discuss the interests in a start-up meeting.

The client has been able to create a good contract despite the great uncertainties at the start of the project. All parties seem to be content with the contract and how it worked out.

The spreading of the risk by using this pricing mechanism wasn’t even necessary according to Thijs Woolderink. The client could even have said: “This is the work, do a (fixed) bid”. Then Rijkswaterstaat would not need to put so much effort in this complex part of the contract.

The indicative investigation of the client could be enough information for the contractor to base his bid on.
Of course the bids would in that case be higher than they were now, but it would cost less time and energy for the client and less discussion with the contractor about the classification. The contractor has a lot of experiences with these projects, for the client it’s attractive and valuable to use this expertise.

**Realisation phase**

Directly after the award of the contract a Project Start Up with both client and contractor was organised. At this PSU also the head of the regional department of Rijkswaterstaat (HID) and the management of Boskalis were present. The fact that the management of both parties was present has probably been essential for the result of the project. During this PSU one had stated that a good relation between client and contractor is necessary and cooperation should have a large role in this project. This was one of the first projects with a new approach for contract management of Rijkswaterstaat (Dutch: Systeemgerichte Contractbeheersing), which made that it had to work out in the right way. By inviting also the management of both parties the importance of this approach became clearer.

There have been some discussions in the realisation about vagueness in the contract. All discussions are dealt with without any arbitration.

The complexity in the contract is mostly caused by the classification of the spoil (see for explanation of this classification the interview of Lam and Van der Hell). This classification determines the price and because it turned out to be interpretable in different ways, it led to discussions. It was vagueness in the contract which made discussions possible. Both parties had the idea that it was clear, but were confronted with another way of thinking of the other party. If the contractor would have the idea that it was unclear, they would have asked questions about it in the information rounds. In the end both parties have moderated their demands, because this was best for both interests.

The discussion had to do with the criteria for acceptance of spoil of one specific depot. This depot uses the spoil in two ways (for reuse and for building the depot), which meant that acceptance can be seen in two ways (only for reuse or for both ends).

Also some other discussions have taken place, for example about the checks on the requirements that had to be done by the client. These discussions were solved on the level of the project manager. The discussion about the classification of the spoil was solved on one level higher.

This way of decision making was already decided upon in the PSU. An ‘escalation model’ was made which stated that each time both parties could not agree the discussion was transferred to one level higher in both organisations.

An incident in the realisation was a power cable (providing a complete factory) that was hit during the dredging. One already expected the cable to be on
smaller depth than what was taken into account (and discussed this with the client), but during execution it turned out to be even less deep. This led to a high claim of that factory for all suffered losses. Boskalis states they could not know this from the provided information. There is no result of this claim yet.

A point of improvement is the way the client did the control of the contractor. In the new approach of contract management (SCB) the client frequently checks the plans and processes of the contractor, reasoning that if processes are accepted they will lead to a proper end-product. In this project the client forced the contractor to monitor his processes and also checked the end-product. This meant a lot of work was done as well by the client as by the contractor, done twice. This was not a big issue for the contractor, but it is not expected with this new approach of contract management (SCB).

**Context/project specificity**

This approach could not simply be used on any other project. Specific for this project is the long planning period the contractor got from the client. This was necessary because of the large uncertainties at the start.

If the client puts pressure on the realisation, more parts of the work remain unclear at the start of the realisation and therefore more risks are with the contractor. In this project all vagueness was taken away before the first realisations started.

What has helped in the success of the project was the good communication between the parties and the sharing of the experiences.

The project was quite unique, which made image more important. That was of large influence in the success of the cooperation.

Complexity was hardly in technical aspects, but the stakeholder management and contact with the users was indeed complex.
General information project
For the MV2 a tailor-made contract was drawn up, a combination of a D&C contract (but written with the DBFM philosophy) and a maintenance contract. For this work the Directive 2004/17/EC of the European Parliament and of the Council of 31 March 2004 coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors applied. As a consequence the client had more freedom to arrange the tendering process than allowed by the ‘classic directive’ 2004/18/EC for works and services. The tender phase was organised as a negotiating procedure (very similar to the Competitive Dialogue). The award was based on MEAT criteria (a combination of price, time and risks; knock-out criteria are used based on technical aspects and completion deadline).

Preparation and tender phase
The client had to deal with a lot of procedures to take away environmental concerns, which resulted in some delays of the preparation phase. On the moment the tender team was involved time became more important. The planning of the tender phase was made leading for the process.

During the tender the following aspects were negotiated (in this order): (technical) scope, planning, division of responsibilities and price. The last three aspects were part of the MEAT criteria.
Before the negotiations the client already made a division of responsibilities and risks (see below). This division was the basis for the negotiations (about risk allocation). Bidders could propose to allocate things differently. The client then has for each adjustment two possibilities: either ‘re-allocation’ is beyond discussion or the client agrees to take back the risk but then puts a price on such adjustment. In the latter case the contractor subsequently can choose whether he will or will not put the adjustment in his final offer (which will be taken into account when deciding what is the best tender (MEAT) by using the price given by the client).
For the MEAT criteria a subdivision was made between the risks that were negotiated (explained above) and client risks that could be reduced by the contractor:

- An example of the first is the cap that is applied for the risk of changes in relevant rules and regulations and other small adjustments necessary for third parties (not initiated by client or contractor). This risk lies with the contractor, but only until a certain amount (4% of the total price). One of the bidders wanted to lower that cap (to 1%). This is taken into account in the MEAT criteria.
The latter are risks that remain with the client and will not be transferred, but that can be reduced (probability of occurrence and/or size of impact) by the contractor. In his offer the contractor proposes mitigations he can take to reduce the client risks. Again, the client establishes a price on this reduction (taking into account a proposal by the contractor) and this will be taken into account in the award. This is for example hindrance for the shipping traffic during the execution of the work. There are a lot of actions the contractor can take (such as training for all captains, extra people on board, etc.) to reduce this risk. All mitigations that are taken into the offer (and thus will be taken into account in the award) will be added to the contract.

**Division responsibilities and risks**

In general the division of responsibilities is the following. The client is responsible for five important permits: Permit to win sands (*Ontgrondingvergunning*); Concession to create new land (*verlening van een concessie in het kader van de Wet Droogmakerijen en Indikingen 1904*); dispensation Flora and Fauna Act (*ontheffing Flora- en faunawet*); Permit Nature Conservation Act (*ontheffing Natuurbeschermingswet*); Permit exploitation Public Works (*vergunning Wet Beheer Rijkswaterstaatwerken*). The contractor is responsible for the design, preparation, realisation, maintenance and transfer of the work (including the therefore needed permits, planning, etc.).

The division of risks is the result of the initial division and the negotiations. There are limits to the capacity of the contractor to bear risks. For example if authorities will not cooperate to provide the permits, the client will be involved. Also extra requirements that result from the permits (when they are unusual) are for the costs of the client and delays caused by the permit procedures will postpone the end date.

The initial allocation was made by making an explicit analysis. The trade-off was between what is reasonable to ask from the contractor (what is common work for him) and what cannot be borne by him? The division is strict: the contractor would never have to worry about the permits and vice versa.

The adjustments in the allocation of risks (including caps) are translated into the price and into the contract. There are penalties if the contractor does not realise what was agreed upon. For time (and thus delays) things were arranged differently. A set of scenarios for the end date were made by the client with corresponding costs. For the client it was easy to translate time into money, because the business case of this project is very clear and one can clearly derive the costs of delays from it.

In this way there is a flexible way of dealing with the end date possible and had the client the possibility to choose (at a later moment) for the best scenario. This also was done in view of the possible delays in the permit procedures (see below). The contractor will be motivated to finish in time, because a penalty was included for not finishing before the contracted milestone.
Also included in the contract was the right to postpone the start of the work by the client. This was incorporated because of the possibility that parallel procedures for permits, exemptions and concessions (the five main permits described above) delayed. This happened indeed and the client could now postpone the start of the work by only paying a compensation for the cost made until the delayed start. In this way one could deal with these uncertainties in a flexible way.

In the tender (and the contract) pro forma requirements, possibly resulting from the permit procedures, were used to be able to base the bid on something. Unit prices were asked to be able to change the requirements using reasonable prices (obtained in competition).

By making the unknown things ‘cost plus’ (such as the unknown requirements of the permits) there is an incentive for the client to work for a good result of the procedures.

Jan Ochtman has the idea that this division was quite optimal, due to the high expertise of the tender team and the extensive negotiations. In the tender team people with experience in dredging (formerly at the contractor’s side) were involved, which was an advantage for the client.

In the negotiations the difference between the bidders became clear: the contract was innovative for this sector and the reaction on that approach differed clearly: the one bidder was far more conservative than the other. Before the start of the negotiations the client did not exclude any item from being discussed and adjusted.

The contract states that Acts of God do not exist other than those specified in the contract. The bidders however had the possibility to identify individual risks as ‘Acts of God’. When the client agreed, that risk would be listed in the contract as such. When such event occurred, the client would bear the delays (the end date would be postponed) and both parties would bear the made costs themselves.

At the end of the negotiations – when scope, planning and the division of responsibilities were discussed and the prices would be discussed – it turned out that the bid prices were far too high. The bidders might have had the idea that the price was not very important for the client, because this was discussed last, and therefore placed a high bid. These bids were too high for the client and therefore the prices were again firmly discussed in an extended negotiation.

Still, Jan Ochtman thinks it is necessary to first discuss the scope and the division of responsibilities and risks before one starts talking about the price.

The negotiations about the division of responsibilities only took a small part of the total negotiations.
Jan Ochtman has the idea the division of responsibilities is the right one. Both parties also think they have a reasonable price, which results in less discussions during the construction. The fact that both parties think they have a reasonable price has been helped by the unexpected decrease of work and dropping of prices within the dredging sector.

**Realisation phase**
During the realisation phase the contract turned out to be quite favourable for the client. During the last negotiations the cap on changes in rules and regulations and small changes in scope was lowered to 1% (per incident!), which is still quite a large amount in a €1.2 bln contract. For the client this was a means of putting pressure on the contractor: he could each time claim extra work if the contractor did not cooperate. The way the client uses this means is very important. He should not abuse it and ruin the relation between the parties.

By having the allocation of risks arranged clearly (and thus have both parties dealing with their own issues), the contact between the parties can be focused on the most important issues of the project: both timely completion and the question whether the seawall complies with the requirements.

**Context/project specificity**
This project is very unique for the dredging sector in the Netherlands, both in size and nature (D&C). This was a reason for the client to hire a lot of expertise on this project (of every six people involved in the client organisation, five were hired). All these people were carefully selected and there was a lot of attention for quality control.
Next to this, the uniqueness of the project enabled such special contract to be made.

The project was specified in a very functional way. This means there was a lot of solution space to the bidders. This also meant the client had to go into the solutions of the bidders (which differed at some points significantly) to find out what risks it would bring and how to deal with that. Because both parties were into the solutions, a sharp discussion on the risks was possible.
This has also to deal with the fact that on both sides (client and contractor) the best people were involved.

This project has no complex interfaces (it has complex relations with the environmental aspects, but that was fully the responsibility of the client), but it was complex in a technical way. The whole work was ‘state-of-the-art’, although dredging is a quite traditional sector. This meant a lot of (external) people were involved to find out whether certain techniques were possible to use. Decision making had therefore to be formalised to be able to come to decisions.
At the start of the project there was some uncertainty about the procedure for the most important permits. The client chose to have that procedure parallel to the tender procedure and make sure parts that could be adjusted because of the delayed permits process are included in the contract with the necessary flexibility. Also the bidders were involved during the negotiations to think about how to deal with the requirements coming from the permits.
Peter van der Linde  
PUMA (Boskalis)  
Maasvlakte 2 (MV2)  
27-07-2010

General information project
Peter van der Linde was as well involved in the tender phase as in the realisation phase as member of the Board of Directors of PUMA. PUMA is the combination of the two dredging companies Boskalis and Van Oord.

Preparation and tender phase
Timely before the project was tendered people within Boskalis were trying to find out how to prepare for this large and special tender. They also lobbied for a special approach for this project such as an alliance or a competitive dialogue. Boskalis thought they would be capable of standing out between the other parties and such special approach would be beneficial for them. They tried to determine what would be decisive in this project, what the risks are and what would be the strength of Boskalis in order to be able to do a competitive bid. By informal contact with the client and in the EIA procedure they tried to arrange as much freedom in the assignment to be sure they would have the solution space to stand out in the tender phase.

It turned out that probably the most important parts of the project would be the efficiency in the process of sand extraction, transport and land reclamation and the optimisation in the design of the hard seawall. This meant it would be better to combine with Van Oord in order to have enough flexibility of equipment (and thus reach such efficiency) and more capacity/quality in the people (to be able to deliver a very good design).

During the tender phase there was an extensive negotiation phase. Initially, these negotiations did not change a lot for the division of responsibilities and risks (see below for full explanation). Still, Peter van der Linde thinks it was worth all the effort. During the negotiations the bidders got more information, had the time to work things out, were able to reduce some risks and could thus make a competitive bid.

Division responsibilities and risks
The division of responsibilities and risks was quite clear: everything except the five main permits were allocated to the contractor. During the negotiations PUMA tried to push some risks back, because they thought there was too much uncertainty on some points (particularly in the permits) to be able to make a fixed price.
In the end hardly anything has changed during the negotiations (only some caps are applied), as the Port Authority priced the risks too high for the bidders to transfer them back to the client. Besides, because of the long tender phase the parties had a lot of time to map out the risks.
During the negotiations the contractor did not want to disclose too much information based on the idea that such information would reach their competitor.

After the best and final offer (BAFO) was done and it turned out the client did not agree with the bids, another negotiation round was introduced. In this round the pricing of some risks were discussed. Now some more pressure was on the situation as all parties wanted to gain as much as possible, but still wanted to have the deal succeeding.

The Port Authority did not agree with the pricing of risks around:
- the maintenance of the seawall,
- the measures against spraying of sand,
- the cooling water outlet (of a factory) and
- the location of the sand extraction.

They thought the prices on these risks were too high. The contractor (still) thinks these were the right estimations of the risks. It was clear the perceptions of the parties differed here.

Therefore these risks were transferred back to the client or taken into the contract in the form of a provisional sum.

In the end the contract was a fixed price contract, except for the parts of the list above (that were dealt with in a provisional sum) and a small part where an alliance was formed. The contractor had proposed to form an alliance with the client for the optimisation of the hard seawall. Everything that would be won by this alliance would be shared between the parties.

For these adjustments in the contract (the four risks that were re-allocated and the alliance) the contractor could give a reasonable discount, which was enough for the client to make the deal.

**Realisation phase**

Risks that were discussed in the negotiations turned out not to be the main risks in the execution. It is unclear whether this is caused by the fact that these risks are discussed and thus reduced or by the fact that one did not have a good view on what would be the main risks.

The risks that were taken back by the client (anti-spraying measures and cooling water outlet) turn out to be as expensive as was calculated by the contractor.

The alliance for the hard seawall works very well; one can see both parties have the same goal now. Otherwise, the client would have argued for a solid design (as he would later on be responsible for the maintenance) and the contractor for a slender construction (as he would need to realise it within a fixed price). Now both interests are taken into account.
This is even enforced by the fact that the construction will be transferred to Rijkswaterstaat in a later phase. Rijkswaterstaat asks for a ‘low maintenance solution’.

The Port Authority had a delay option built into the contract to be able to deal with possible delays in the permit procedures. The contractor would then get a daily allowance for starting for ‘the outside world’, but this allowance was too low to be able to pay for all ships waiting. Therefore a mobilisation period was introduced, which meant that as soon as the contractor would get the signal to start he would have a certain period to get all equipment to the project and then start the work. All milestones of the project would be shifted backwards proportionally. This was a workable solution for the contractor; especially because he got in this way time to optimise some parts of the project even more.

**Context/project specificity**

The fact that this project is quite unique has no real influence on the way of working. It might have some influence on the pricing by the contractor, because he wanted to win the project and thus did a very competitive (but still sensible) bid.

There was limited solution space in this project (of which most was in the hard seawall).

In this project there was one major interface (which can be split up in many small ones): with the Maasvlakte 1. The contractor had to coordinate all those interfaces to be sure all connections were right. This went all very well: all parties cooperated to make it succeed.

The project was indeed complex in a technical way: the combination of size, new equipment, complex design (of the hard seawall) and the complex logistics made it a challenging project. Despite this complexity, the risk premium is relatively small. Nevertheless, it did draw a lot of attention towards the risks.

There is certainly time pressure on this project as some deals are made with future users. The client introduced some ‘speedup options’, that were all priced, to be able to assign the contractor to finish earlier than planned. Still, there was enough time to deal with the uncertainties and to optimise the solution.

Peter van der Linde thinks it would have been better for all parties if the Port Authority would have chosen to form an alliance with one party and try to optimise the whole project. One would have had more time to optimise when working together like that (instead of negotiating for a long time). Probably the Port Authority was afraid to pay a very high price for such approach. Peter van
der Linde thinks it is also possible to agree on a certain margin of profit and base the price on that.

The result of the project is still uncertain, but for the time being it seems successful.
D  Analysis scheme
This project is not complex in a technical way. This means the client has to specify a lot. It should be clear this is a potential source for mistakes.

Context variables
The allocation was made by the client and has hardly been changed, because of time pressure. Therefore no allocation ... 'influence' can be recognised in the discussion: the contractor did not agree as he was not able to influence the risk.

A tailor-made contract was used for this project. This means specific arrangements, such as the 5% in this contract, are not familiar to the people involved.

Project Situations
Pricing risks
Coupling individual benefit with total
In this project one had decided not to use pricing of risks, because the client thought it was difficult to price the risks and it would take too much time during the tender phase.

Quantities of asphalt
The quantities of porous asphalt on the road had more budgetary means to motivate the other contractor.

Pumping station
An existing pumping station seemed ready for this project. This meant that the contractor had to relocate it in a lead time that was unrealistic.

Decontamination
In the provided information there is no incentive for the client to deliver good work on this point. Now it turns out he bears part of the responsibility.

Maintenance bridge
For the maintenance of a bridge (part of the road) the contractor, in the piles of information available, was not able to put more effort in providing the right information due to the time pressure that was on the project.
The responsibility that could be allocated (the client is the only one to dredging) is the measuring of the quantities and quality of the spoil. There would be several ways to deal with this issue. The client could try to find out precisely how much spoil of what categories had to be dredged, but that would be very expensive and time-consuming. Alternatively, the client could allocate the responsibility for measuring the spoil to the contractor, but this would still require the client to have a clear idea of the quantities and quality of the spoil. The contractor could then measure the spoil and provide the client with accurate information.

The contract stated that the client was responsible for the public communication. The contractor was willing to do the communication, but the client was not sure if the contractor was the best person to do it. The client thought it would be better if they handled the communication, while the contractor was bound to it policy.

The criteria are not used explicitly. Not relevant for this issue. As said before, if this part of the contract, with all kinds of unit prices in the contract, for the client to arrange something to compensate for the cost made until now would not be a possibility to optimise. One effect was that the contractor wanted to win the project and therefore was prepared to realise some discount on the price in the extra negotiation procedure, but this effect seemed not be very large.

Optimal division of responsibilities

Dialogue on transition risks

Allocation based on the allocation of responsibilities

The specific part in the contract about the pricing of the spoil was in principle a good idea of the client to deal with this uncertainty. Nevertheless, it turned out the way it was written down in the contract had wrong estimations of the costs of the spoil. This leads to high uncertainties, especially for pricing the work. Therefore 'pro forma' requirements were taken into the contract, with all kind of unit prices in the contract, without an exact estimation of the costs, so the contractor had to bear high costs. This incentive was not explicitly made, but was something the client wanted to deal with.

During the negotiation phase, the bidders are sometimes asked about the preliminary requirements that were discussed in the contract and the client would like to have a more detailed idea of what the requirements are. They could also propose solution for current problems in the permit procedures.

This had large influence: both parties wanted the project to be a success and were focused on cooperation and a good relation. This made it easier to help each other out in difficult situations. The client explained the need for this and the contractor was willing to help. This was a flexible solution for a difficult situation.

The client had the responsibility to deal with UXO, but could only do that if the contractor is the only one dredging. The client had to arrange something to compensate for the cost made until now because otherwise he had to bear high costs. This incentive was not explicitly made, but was something the client wanted to deal with.

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One effect was that the contractor wanted to win the project and therefore was prepared to realise some discount on the price in the extra negotiation procedure, but this effect seemed not be very large.

The starting point was a very clear division, but by transferring back to the initial allocation turned out not finished on the moment the contract was awarded, one did not know exactly what kind of requirements would result from the allocation of responsibilities. This leads to high uncertainties, especially for pricing the work. Therefore 'pro forma' requirements were taken into the contract, with all kind of unit prices in the contract, without an exact estimation of the costs, so the contractor had to bear high costs. This incentive was not explicitly made, but was something the client wanted to deal with.

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E  Proposed allocation process

Starting point for this approach is a well-thought division of responsibilities. Making such division lies outside this research, as it is based on a consideration of policy and competence of the client, market situation, budgetary reasons, etc. Such division can for example be made by using a decision model, as discussed earlier in this report.⁴

The basis of the approach lays in the different use of the allocation criteria (as discussed in J.2.4): the ‘influence-criterion’ check the division of responsibilities and – thus – determines the risk allocation and the other criteria are used for fine-tuning that allocation. This is summarised in the following figure.

- Division of responsibilities
- Influence?
  - Division of risks
  - Fine-tuning
  - Contract documents

When looking more in detail to this approach, the following steps can be recognised:

1. Division of responsibilities
   a. Which responsibilities lie with the client and which with the contractor? Name them explicitly and be aware of responsibilities as the formulation of the specification and the provision of information.
   b. Which (large) risks lie within these responsibilities? Are there other large risks that do not directly seem to belong to these responsibilities?

⁴ Rijkswaterstaat and Twynstra Gudde have developed a decision model for making such division: Ibid.
2. Division of risks
   a. Are the parties able to influence the risks that are now allocated to them?
      No? Reconsider the division (step 1) or consider the possibility to share responsibility (working and bearing together) or risk (bearing together).
   b. This results in a division of risks.

3. Fine-tuning
   a. Are the bidders able to assess the risks allocated to them?
      No? Consider cost plus (no fixed price), sharing or reallocation later in the project.
   b. Are the parties able to bear the risks?
      No? Consider capping.
   c. Are the parties motivated to reduce/manage the risks because they bear the consequences?
      Attention: a contractor can in principle bear no consequences in terms of time and quality (time is possible within project boundaries, but not in terms of end date)
      No? Consider coupling individual benefit to total benefit
      Attention: when knowing each other’s interests, one might find other motivations than financial ones
   d. Are there client’s risks that can be reduced by the contractor?
      Consider building in an incentive.
   e. Are process agreements formulated for the occurrence of risks for which the contract did not foresee?
      No? Consider adding such process agreements to the contract
   f. Are there parts of the project with high uncertainty, great technical complexity or where optimisation is desirable? Consider a flexible contract: cost plus, sharing or later reallocation.

The results of each step should be laid down clearly in contract documents.

The full approach can be found in the figure on the next page.