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# Conflicts between client and contractor

*How to prevent them before the contract is fixed?*



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*How to prevent them before the contract is fixed?*

By

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*'Understanding a question is half an answer'*  
*- Socrates*

*This thesis is confidential and cannot be made public until January 31, 2017.*

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# Preface

With this thesis I conclude my time in Delft and finish the master Construction, Management and Engineering at the Faculty of Civil Engineering and Geosciences. I conducted my thesis as research intern within Royal HaskoningDHV (RHDHV). This process started half a year ago, searching for a potential topic to investigate that would be interesting to RHDHV as well as to the academic field and to myself. The idea to investigate conflicts between clients and contractors during projects started after finishing my internship at a joint venture a year ago, where Ballast Nedam almost went bankrupt as a consequence of its struggles in the MaVa project. A relation between conflicts during the contractual phase and the type of interaction during the pre-contractual phase is not frequently made. The interesting relation and paradigms between the pre-contractual and contractual phases kept me interested during the whole process.

Before presenting the resulting thesis, I would like to thank a few people for supporting me during this research. First, I would like to thank all my colleagues at RHDHV for the very pleasant working environment and the open attitude towards my research. As a result, I never had to balance between the academic requirements and the company's wishes.

Second, I would like to thank my graduation committee of the TU Delft for their comments, critical feedback, suggestions and guidance during the process. You made it possible to reach a higher academic level.

A special thanks to my company supervisor Piet Kunst for your supportive attitude during this process. Subsequently I would like to thank all the colleagues and other persons who opened their network and made it possible to conduct 31 interviews and other meetings. Additionally, a thank you goes to all the participants of those many interviews who made their time available to be open about their experiences.

And last, but not least, I would like to thank my friends and family for their support throughout my thesis and my time in Delft.

*Esther Korvinus*  
*Delft, January 2017*

# Executive summary

The need for research on conflict prevention during the pre-contractual phase is based on three findings. Firstly, conflicts in infrastructure projects are seen as a main cause of project failure. The costs of conflicts vary considerably between additional costs through delays or claims and high litigation costs for juridical procedures. Secondly, organisational ineffectiveness may result from conflicts, since the progress is hampered by the effort needed to solve the conflict. Thirdly, infrastructure projects are financed by the tax payers. Every year billions are invested in infrastructure projects. High failure costs should thus be prevented and the effect of improvements could be high.

Preventing conflicts in the contractual phase by making adjustments in the pre-contractual phase is complex, because of two reasons. Firstly, there is a contradiction between a competitive environment during the pre-contractual phase and a collaborative environment during the contractual phase. Secondly, the collaboration is based on conflicting interests during the pre-contractual phase. The client, which is a public organisation with social accountability and a private organisation with commercial interests have opposing interests. The research question of this research is: *How to prevent contractual conflicts between client and contractor during infrastructure projects before the contract is signed?*

The research starts with two parallel parts; identifying root causes of conflicts and determining conflict prevention methods. They both consist of a desk- and a field research. The combination of the results of these parts composes a process framework for the pre-contractual phase focused on conflict prevention. This process is validated through analysing two projects, simulation sessions and discussions with experts.

## Conflict causes

There are three main types of conflict causes:

- Project related causes as design quality, information overload and delay.
- Process related causes as human behaviour, management and communication
- Contract related causes as contract ambiguities, contractual arrangements and juridical procedures

These three types of conflict causes resulted in a list of 32 possible conflict causes. The 30 interviewees were asked which causes most often lead to conflicts and which do not. This

resulted in three perspectives on conflict causes as well as to a complex network of interrelations between the different causes. The six dominating causes in this network are identified as the six root-causes of conflicts.

*Perspective 1: 'Unpredictability and uncertainty'*

This perspective is supported by 12 contributors, consisting of five contractors, three clients and four consultants. In their view a combination of unforeseen contingencies, contract ambiguities and interpretations together with distrust between client and contractor evokes a conflict. Discussion on the responsibilities of risks is thereby an essential part in this combination of ambiguities and unforeseen contingencies.

*Perspective 2: 'Human and behaviour'*

The contributors of this perspective have valued the process related causes as most important for escalating conflicts. Distrust in combination with insufficient knowledge of each other's interests results in a situation where both parties do not understand and respect each other. Unrealistic expectations of the client in combination with opportunistic behaviour of the contractor are a hazardous combination when occurring together. The seven contributors state that changes during the project, contradictions in documents or errors and ambiguities in the contract are negotiable, when the human factors have a sufficient level.

*Perspective 3: 'Lack of clarity and competence'*

Lack of clarity and competence are the determining causes of conflicts according to the nine contributors of this perspective. Quality of design as project related cause is named as the number one cause of conflicts. The combination of insufficient knowledge of each other's interests and a lack of communication results in misunderstandings. This can lead to surprises to the other party in a project, whereby the parties block their further communication. Stuck communication hampers further converging of opinions, which is vulnerable for conflicts.

The network analysis is performed by coding the 30 interviews while they explained their most extreme scored statements. This resulted in the identification of 6 root causes: Strategic behaviour, misaligned expectations, insufficient knowledge of each other's interests, distrust and lack of team spirit, diverse interpretation of contract terms and stuck communication. Almost all these conflict causes are process related causes only one contract related cause. The absence of project related causes is notable.



## Conflict prevention

There are two main approaches on contract strategy; role-oriented and project-oriented, see Figure 1 and Figure 2. The role oriented approach accesses contract strategy mainly from their role in the project. The client is responsible for the pre-contractual phase and does not involve the contractor in this process. Control-based prevention methods are used, which ensures a level playingfield and ultimate competition between the contractors. In the project-oriented approach the project roles are subordinated to the project interests. Involving the contractors in an early phase provides the opportunity to incorporate their knowledge, define common objectives and share responsibilities.

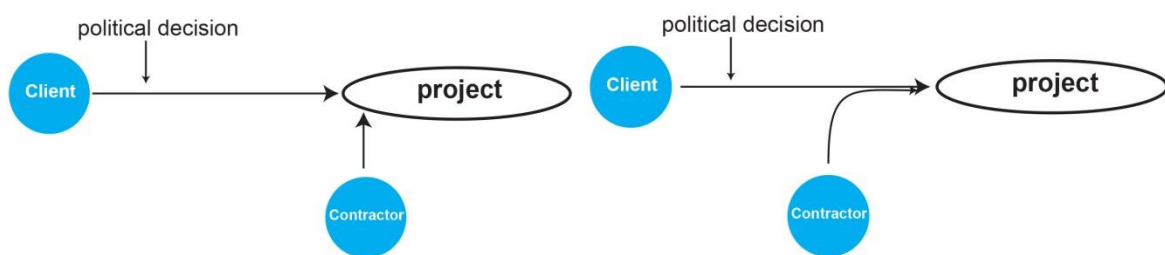


Figure 1: Role-oriented contract strategy

Figure 2: Project-oriented contract strategy

The associated conflict prevention methods differ in method-owner and method-goal. The role-oriented prevention methods should be conducted by the clients and aim to optimise the pre-contractual phase by improving the information supply of the client and the contract quality. The project-oriented methods imply involvement of both the client and the contractor and aims to improve early alignment of objectives, responsibilities and the creation of a collaborative environment also in the pre-contractual phase.

The data analysis to conflict prevention showed a current practise of role-oriented methods to prevent conflicts by early risk sessions and including past experience in future contracts. However there was a preference for more project-oriented methods through dialogues and familiarizing at an early stage. Combing the analysis to conflict causes and conflict prevention resulted in a process framework for the pre-contractual phase.

## Conclusions

The process starts with the adoption of a project-oriented contract strategy. The project-oriented methods align more closely with the identified root-causes than the role-oriented. This has consequences for the method-owner and the method-goals. While the initiation of the methods will be the clients' responsibility, the contractor should actively cooperate. The goals are mainly behavioural with little task-oriented elements. A contract structure should be



composed, which facilitates the opportunity to encourage a qualitative tender aligned with the interests and expectations of the client. The incorporation of market consultations may be used to validate this intention and involve the contractors' perspective on established contract structures and the associated incentives, selection and tender criteria. During the tender phase physical interaction moments should be used to interact with each other. The frequency of those interactions may depend on the organisational and technical complexity of the project. The effectiveness of these interactions is also related to the discussed substance. The relevance of the discussed substance, technical and organisation, and the room for a relational connection are contributing to the decrease of the probability of conflicts. Client and contractor should (1) increase their knowledge of each other's interests, (2) align expectations about project goals, process details, and behavioural rules and (3) discuss diverse contract interpretations.

The research stipulates a need for openness about interests, expectations and interpretations in an early phase. Current means as dialogues during the procurement phases already exist. However these dialogues are not always used to discuss relevant substance as misaligned interpretations and interests. A possible explanation is the tendency to withhold information out of strategic considerations. This relation between confidentiality and openness is thus important with respect to sharing sensitive information as interests. This requires professionalism of the dialogues and the communication concerning the implications of the shared information. Clarity about which information is shared with other contributors of the dialogues is a way to increase this professionalism. Additional attention to the knowledge about procurement processes and the craftsmanship of good procurement provides possibilities to increase the quality of procurement processes and reduce the struggles with juridical procedures.

Besides more physical interaction moments, three preconditions are required to benefit from more effort during the pre-contractual phase. First of all, team formations during the pre-contractual phase and the contractual phase should be consistent. Knowledge about intangible aspects as interests, expectations and interpretations are hard to handover to a next operating team. Therefore consistency in teams is necessary to benefit from the extra effort made in the pre-contractual phase. Secondly, the selection criteria should make it possible to select the contractor pertaining most to the interests of the client. When the project is more complex, market consultations can be used to discuss the selection criteria. Thirdly, a reasonable risk distribution prevents an unequal relationship and subsequently limits opportunism of contractors concerning uncontrollable risks.

# Samenvatting

Het belang van een onderzoek naar het voorkomen van conflicten in de precontractuele fase is gebaseerd op drie bevindingen. Ten eerste worden conflicten gezien als de belangrijkste faaloorzaak van infrastructuurprojecten. De bijkomende kosten door conflicten variëren van verdragingskosten en schadevergoedingen tot hoge proceskosten, wanneer juridische procedures worden ingezet. Ten tweede zijn er nadelige gevolgen voor de teameffectiviteit. Aandacht en energie van het team dat wordt geïnvesteerd in het oplossen van het conflict, kan niet worden besteed aan de projectvoortgang zelf. Ten derde zijn hoge kosten voor conflicten onwenselijk, omdat het indirect geld is van de belastingbetaler. Elk jaar worden er miljarden besteed aan infrastructuurprojecten. Het is dus van maatschappelijk belang dat dit geld zo goed mogelijk wordt besteed.

De complexiteit van het voorkomen van conflicten tijdens de contractuele fase doormiddel van aanpassingen in de precontractuele fase komt hoofdzakelijk door twee omstandigheden. (1) Tijdens de precontractuele fase overheerst een competitief speelveld tussen opdrachtgevers en opdrachtnemers, terwijl in de contractuele fase wordt gestreefd naar een samenwerking tussen deze partijen. (2) Daarnaast wordt er gestreefd naar een samenwerking tussen twee partijen met tegenstrijdige belangen. Een publieke opdrachtgever, die zoveel mogelijk waarde wenst voor zijn belastinggeld en een private opdrachtnemer, die zoveel mogelijk geld wil verdienen voor zijn toegevoegde waarde. De onderzoeksvraag is: *Hoe kunnen conflicten tussen opdrachtgever en opdrachtnemer tijdens de contractuele fase van infrastructuurprojecten worden voorkomen, voordat het contract getekend is?*

Het onderzoek start met twee parallele delen; identificeer conflict oorzaken en bepaal mogelijke preventiemethodes van conflicten. Beide bestaan uit een literatuuronderzoek en het verzamelen van empirische data. De samenkomst van deze delen vormen de input voor deel 3; aanpak precontractuele fase ter voorkoming van conflicten. Validatie is gedaan doormiddel van simulatie sessies, analyse van 2 projecten en discussie met externe experts.

## Conflict oorzaken

Er zijn drie verschillende type oorzaken van conflicten:

- Project gerelateerde oorzaken, zoals de kwaliteit van het ontwerp, hoeveelheid informatie en vertraging.
- Proces gerelateerde oorzaken, zoals gedrag, management en communicatie
- Contract gerelateerde oorzaken, contract onduidelijkheden, contract afspraken en juridische procedures

Een lijst van 32 verschillende conflictorzaken is samengesteld om de variëteit van deze drie type oorzaken te vertegenwoordigen. Dit was input voor de onderzoekstechniek *Q-methodologie* voor de interviews met 30 respondenten (10 opdrachtgever, 10 opdrachtnemers en 10 consultants). Analyse gaf naast drie verschillende perspectieven over het ontstaan van conflicten, ook een complex netwerk van relaties tussen deze verschillende oorzaken. De zes dominerende oorzaken binnen dit netwerk zijn geïdentificeerd als de hoofdoorzaken van conflicten.

#### *Perspectief 1: 'Onvoorspelbaarheid en onzekerheid'*

Dit perspectief wordt gevormd door 12 respondenten, bestaande uit vijf opdrachtnemers, drie opdrachtgevers en vier consultants. De combinatie van onvoorziene omstandigheden, contract onduidelijkheden en interpretaties samen met wantrouwen leiden het meest tot conflicten. Een bepalend element is hierbij de discussie over de verantwoordelijkheden van risico's.

#### *Perspectief 2: 'Mens en gedrag'*

De respondenten behorend bij dit perspectief hebben de proces gerelateerde oorzaken als hoogst gewaardeerd als conflictorzaak. Wantrouwen in combinatie met te weinig kennis over elkaars belangen resulteert in een situatie, waarbij partijen elkaar niet begrijpen en niet respecteren. Binnen dit perspectief worden wijzigingen tijdens een project, tegenstrijdigheden in documenten of fouten en onduidelijkheden in het contract als verwaarloosbaar beschouwd, wanneer de procesafspraken het juiste niveau hebben.

#### *Perspectief 3: 'Ontbreken van duidelijkheid en competenties'*

Onduidelijkheid en het ontbreken van de juiste competenties gevoed door niet goed werkende communicatie(structuren) zijn bepalende factoren voor het ontstaan van conflicten volgens de negen respondenten van dit perspectief. De kwaliteit van het ontwerp als project gerelateerde oorzaak is de hoogst gewaardeerde oorzaak van conflicten. De combinatie van te weinig kennis van elkaars belangen en te weinig communicatie, veroorzaakt het

divergeren van opvattingen over de projectbelangen. Dit resulteert in het verrassen van de andere partij, wat vervolgens een communicatie-blokkade veroorzaakt.

De netwerkanalyse is uitgevoerd doormiddel van het coderen van de 30 interviews. De toelichting van de meest extreem gescoorde conflictoorzaken is de input van de analyse. Dit resulteerde in de volgende zes dominerende oorzaken: Strategisch gedrag, uiteenlopende verwachtingen, te weinig kennis van elkaars belangen, wantrouwen & te weinig team gevoel, andere interpretatie van contracttermen en stukgelopen communicatie. Kenmerkend is de overheersing van vijf proces relateerde oorzaken, enkel 1 contract gerelateerde oorzaak en het ontbreken van een project relateerde oorzaak.

### Conflict preventie

Er zijn twee manieren om de contractstrategie in te steken: Functie-georiënteerd en project-georiënteerd, getoond in Figure 3 en Figure 4. Bij de functie-georiënteerde benadering beschouwt de opdrachtgever de contractstrategie vanuit de functieverantwoordelijkheden, die opdrachtgever en opdrachtnemer hebben in het proces. De opdrachtgever is verantwoordelijk tijdens de precontractuele fase en betreft de opdrachtnemer hier verder niet bij. De project-georiënteerde benadering beschouwt het project dominant boven de projectrollen van opdrachtgever en opdrachtnemer. Door de opdrachtnemer al in een vroege fase te betrekken in de precontractuele fase kan een vertrouwelijke band worden gebouwd en kunnen gezamenlijke doelen en gedeelde verantwoordelijkheden worden bepaald.

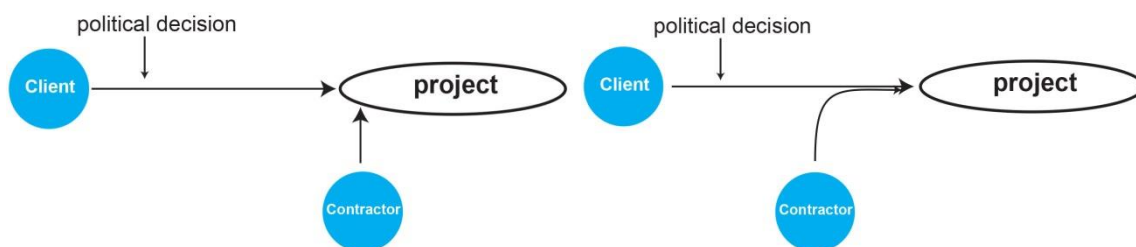


Figure 3: Functie-georiënteerde benadering

Figure 4: Project-georiënteerde benadering

De conflictpreventie methodes, die bij deze benaderwijze horen, verschillen op het gebied van eigenaarschap en doel. De functie-georiënteerde preventie methodes worden geïnitieerd en uitgevoerd door de opdrachtgever zelf en hebben als doel de precontractuele fase te optimaliseren door verbeterde informatie overdracht en de kwaliteit van contracten. De opdrachtnemer is hierbij alleen passief betrokken. De project-georiënteerde preventiemethodes worden geïnitieerd door de opdrachtgever, maar vereisen actieve

deelname van de opdrachtnemers. Naast het bij elkaar brengen van doelen en verantwoordelijkheden tijdens de precontractuele fase, hebben deze methodes het doel om een coöperatieve atmosfeer al tijdens de precontractuele fase te creëren, wat vervolgens logisch continueert in de contractuele fase.

De analyse naar huidige conflictpreventie methodes laat zien dat vooral functie-georiënteerde methodes worden gebruikt, zoals interne risico sessies en het opnemen van vorige ervaringen in nieuwe contracten. De 30 respondenten hadden echter een grotere voorkeur voor project-georiënteerde methodes in de aanbesteding, namelijk het vroegtijdig leren kennen van elkaar en het voeren van dialogen. De combinatie van de analyse naar conflictorzaken en conflictpreventie methodes resulteert in een procesbeschrijving en de volgende conclusies.

### **Conclusies**

Een precontractuele fase gericht op conflict preventie start met het implementeren van een project-georiënteerde benadering van de contractstrategie. De project-georiënteerde methodes hebben meer invloed op de geïdentificeerde conflict-oorzaken dan de functie-georiënteerde methodes. Dit heeft implicaties voor het eigenaarschap en doelen van de mogelijke aanpassingen in de precontractuele fase. De initiatie van de preventiemethodes is de verantwoordelijkheid is van de opdrachtgever, maar actieve betrokkenheid van de opdrachtnemer is vereist. De preventiemethodes richten zich voornamelijk op het aanpassen van gedrag met taak-inhoudelijke elementen. De contractstructuur moet zo worden samengesteld, dat er mogelijkheid is om kwalitatief goede tenders aansluitend bij de belangen en verwachtingen van opdrachtgever aan te moedigen. Marktconsultaties kunnen gebruikt worden om deze intentie te valideren en het perspectief van opdrachtnemers mee te nemen in het opstellen van het contract, prikkels (bonus/malus), selectie en gunningscriteria. Tijdens de aanbestedingsfase zullen fysieke communicatie momenten moeten worden gebruikt als interactievorm. De hoeveelheid van deze momenten is afhankelijk van de organisatorische en technische complexiteit. De effectiviteit van deze fysieke communicatie momenten is ook afhankelijk van de besproken inhoud. De relevantie van de inhoud, technisch en organisatie, samen met de mogelijkheid om een relationele band op te bouwen dragen bij aan het verminderen van de kans op conflicten. Opdrachtgever en opdrachtnemer zullen tijdens deze communicatiemomenten (1) hun kennis over elkaars belangen moeten verbeteren, (2) verwachtingen over projectdoelen, project details en gedragsregels laten aansluiten en (3) verschillende contractinterpretaties bespreken.

Dit onderzoek benadrukt de noodzaak van openheid over belangen, verwachtingen en interpretaties in de precontractuele fase. Huidige middelen als dialogen tijdens de aanbestedingen bestaan al. Deze dialogen worden echter niet altijd gebruikt voor het openlijk bespreken van verwachtingen, misinterpretaties en belangen. De neiging om informatie achter te houden uit strategische overwegingen kan hiervoor een verklaring zijn. De relatie tussen vertrouwelijkheid en openheid is belangrijk om gevoelige informatie te kunnen delen, zoals belangen. Dit vereist professionalisering van de dialogen en de communicatie over de verwerking van informatie in de precontractuele fase. Duidelijkheid over mogelijk informatie beschikbaarheid voor andere opdrachtnemers als contractinterpretaties en transparantie over het proces. Daarnaast kan extra aandacht voor kennis over het aanbestedingsproces en het vakmanschap van goed inkopen bedragen aan verhogen van de kwaliteit van aanbestedingsprocessen en verminderen van worstelingen met juridische procedures.

Naast extra aandacht voor de fysieke communicatie momenten, verdienen drie voorwaardes aandacht om te kunnen profiteren van de aanpassing in de precontractuele fase. Ten eerste de continuïteit van teams vanuit de precontractuele fase naar de contractuele fase. Kennis over onmeetbare elementen als belangen, verwachtingen en interpretaties zijn lastig over te dragen naar een volgend operationeel team. Daarom wordt continuïteit in teams aanbevolen om te profiteren van deze extra kennis. Ten tweede zullen de gunningcriteria het mogelijk moeten maken om aannemers te kunnen selecteren, die het beste aansluiten bij de belangen en verwachtingen van de opdrachtgever. Wanneer de complexiteit van een project hoog is, kan een marktconsultatie gebruikt worden om gunningscriteria te bespreken. Ten derde is een doordachte risicoverdeling nodig om een ongelijke risicoverdeling te voorkomen, en daaropvolgend opportunisme van de opdrachtnemer te limiteren.





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## List of abbreviations

ADR	-	Alternative Dispute Resolution
CL	-	Client
CM	-	Contractmanager
CO	-	Contractor
CS	-	Consultant
D&C	-	Design & Construct contract
DBFM	-	Design, Build, Finance & Maintain contract
ECI	-	Early Contractor Involvement
EMAT	-	Economically Most Advantageous Tender
GDP	-	Gross Domestic product
MaVa	-	A15 Maasvlakte Vaanplein
PM	-	Projectmanager
RAW	-	Rationalisatie en automatisering Grond-, Water- en Wegenbouw
TCE	-	Transaction costs economics
UAV-GC	-	Uniforme administratieve voorwaarden voor geïntegreerde contractvormen
QM	-	Q - Methodology



# 1.

## Introduction

The success of a project depends largely on the contract strategy and the corresponding behavior of the affected parties (Branconi & Loch, 2004; Vaaland, 2004). The terms and type of the contract should be chosen to facilitate the collaboration between client and contractor. Subsequently it should promote the achievement of the best possible result of projects (Suprpto, 2016b). However, disputes are still one of the main causes of unsuccessful projects (Cakmak & Cakmak, 2014). This introduction mandates the research by stipulating its urgency and relevance.

Early this year several news sources were reporting on the conflict concerning the rework of A15 Maasvlakte Vaanplein (the MaVa project). It was the biggest procurement of Rijkswaterstaat (1.5 billion euro) given to three contractors; Strukton, Strabag and Ballast Nedam. All the risks were transferred to the contractors; all contractors were facing financial difficulties (Cobouw, 2016; Koenen, 2016). An arbitration case on the rework of 318 million euro endured 1.5 years. Also the Dutch project “tweede Coentunnel” required arbitration to resolve a conflict, which resulted in financial disadvantages for both parties, Rijkswaterstaat had to invest another 100 million and the contractors also had their losses (Koenen, 2014). Previous descriptions exclude the costs for the litigation itself. The Balder conflict for example, a case from the Norwegian oil and gas industry, had a 3-4 year court case of high costs. The combined costs for contractor and client were 80 million (Vaaland, 2004). Also smaller projects are facing conflicts, for example the “Drachterseweg” in which the province of Friesland was forced to put an additional 8.5 million into the project (Zwaga, 2016). Above named projects are relatively new projects, however conflicts are not a new problem in the infrastructure sector. A short research into historical newspapers reveals multiple conflicts between client and contractor about local projects (Peel en Maas 1938, IJmuider Courant 1960, Leidsch Dagblad 1960). While the content and context of infrastructure projects have changed over the years, the behaviour of contractor and client only changed slightly with their interests remaining contradictory. The market vision of this year, signed by involved professionals in the infrastructure sector has as main goal to increase the professionalism of collaboration and decrease the amount of conflicts.

Conflicts will only in 5% of the cases end in court. Parties will prefer alternative options before court, as court includes expensive procedures and effort (de Heer-de Lange, Diephuis, & Eshuis, 2013). The numbers of “Raad van Arbitrage in the Bouw” show an increase of cases till 2010 (1305 cases) and a declining number from 2010 till 2012 (1305 – 1241 – 1048 resp.). The Dutch Arbitrage Institute settled 158 cases (arbitrage and binding advice) in 2012 and respectively 131 cases in 2010 (de Heer-de Lange et al., 2013). While the amount of cases settled through Arbitrage, Ed Roijen (Project Director Rijkswaterstaat) states that “Nearly any project finishes without claims” (Roijen, 2015). The Raad van Arbitrage states that the declining number of arbitration cases is due to the decreasing amount of operational projects as result of the crisis in the sector (Raad van Arbitrage voor de bouw, 2012).

## 1.1 Relation client and contractor

The relation between client and contractor within infrastructure projects features a contentious climate, but also a vulnerable relation with a turbulent history. The fraud scandal in the early 2000s restructured the market in the building sector. Multiple persons were accused of cartels and deals between contractors and clients. Contractors made price deals with each other and divided the surplus between the actual price and the bid price with the other bidders. Collaboration with the purpose to increase bid prices by price fixing is illegal. Also, deals between clients and contractors where the tender winner was known before the actual tender were labelled as corruption (Doree, 2004). After this huge scandal, a new way of collaboration between contractors and clients should be established, where the juridical regulations should also be incorporated and followed more strictly. Doree (2004) stipulates the enormous impact of these collusions on the behaviour of public contracting authorities.

The economic crisis marked the period after the fraud scandal with the consequence of decreased building activities. The collapse of the amount of work resulted in a competitive market. The lowest bid price as the procurement criteria was a catalyst for the underbidding of contractors. A hostile environment was the result, where claims for rework are the way to decrease the amount of loss for the contractor (Mark, Rijken, Doornbos, & Mokkink, 2009). The adversarial relationships between the client and contractors resulted in an increase of juridical procedures. Clauses were added in contracts to limit liabilities. Legal procedures can be very costly for both parties which meant smaller margins on the already under-priced projects (Kerkhove & Vanhoucke, 2016). For both the client as the contractor this wasn't an ideal situation. A low price does not guarantee the desired quality. Furthermore, the lowest

bid price does not safeguard the lowest final price, due to the large amount of rework costs (Mark et al., 2009). A new procurement method EMAT was introduced, where clients had the opportunity to select not only on price but also on quality. EMAT stands for Economic Most Advantageous Tender, where criteria next to price determine the total score of biddings. The Procurement Law 2012 obligates clients to use the EMAT procedure (M. A. B. Chao-Duivis, Koning, & Ubink, 2013).

Beside the adjustment to the selection method, the quality of the collaboration during the execution has also received more attention. This attention for collaboration partly emerged from the exasperation resulting from the amount of conflicts between clients and contractors. Conflicts are a logical result during projects, as projects are networks of personal relations with different interests and limited resources (Nordin, 2006; Vaaland & Hakansson, 2003). Conflicts can have a positive impact on the organizational performance when resolved within acceptable time frames. However, when conflicts are not resolved properly, it could prohibit effective group cohesion and cause cost and time overruns (Ongori, 2009). The efforts of both parties are then focused on the conflicts and do not contribute to the progress of the project.

## 1.2 Conflicts in infrastructure projects

The main ingredients for a conflict are interdependence (Ongori, 2009; Vaaland & Hakansson, 2003; Vallacher et al., 2013) and scarce resources (Ongori, 2009; Vallacher et al., 2013), both present in infrastructure projects. Client and contractor are interdependent on multiply elements as information supply, financial transactions and task requirements. Each project is considered as unique with his own project goals and project environment. The interdependencies together with restricted time and budget resources and the uniqueness of each project, make infrastructure projects extremely vulnerable for intergroup conflicts (Cakmak & Cakmak, 2014; Jaffar, Tharim, & Shuib, 2011; Ongori, 2009; Vaaland, 2004). The complex and competitive environment of infrastructure projects adds to the above aspects, which is an extra catalyst for conflicts (Cakmak & Cakmak, 2014).

The relation between collaboration during the contractual phase of projects and their contract strategy is recognised by different authors in literature (Adnan, Shamsuddin, Supardi, & Ahmad, 2012; Kamminga & Smits, 2012; Vaaland, 2004). The contract strategy has a positive correlation with the project outcome of a public project (Bos, 2014; Kamminga & Smits, 2012; Ke, Ling, & Zou, 2015). The client and/or consultant are thereby essential in defining this contract strategy and the additional relational atmosphere (Ke et al., 2015). The

effect of the contract strategy is mainly visible in the contract itself and the procurement strategy. The perception of the procurement process among the project participants is however of major importance for the willingness to cooperate in a later stage (Eriksson & Westerberg, 2011). The relational atmosphere will be most influenced by the first contact between client and contractor rather than future contact moments (Kamminga & Smits, 2012). The first contact is during the procurement phase. The three most-used types of tendering procedures for public clients are the following: direct agreement procedure, restricted procedure with or without pre-selection and open procedure (national or European). The open and restricted procedure is permitted to use in any situation, the direct agreement procedure has budget constraints (M. A. B. Chao-Duivis et al., 2013). The outcome of the procurement phase is the signed contract, where besides the relational atmosphere also the results of the made agreements define the relation during the contractual phase. It is the fixation of the agreements on responsibilities, legal liabilities and (design or engineering) flexibility. Thus if the client wants to minimize conflicts during the contractual phase, changes should already be made in the procurement process, contract structure and governance mechanism.

### **1.2.1 Conflict resolution methods**

While conflict resolution is not part of the scope of this research, a better understanding of the process from conflict to litigation and all the intermediate steps, will broaden the understanding about conflicts in projects in general. Conflict as a disagreement does not have to be resolved in court. There are several stages before litigation to settle before a conflict escalates. The first indication that an improvement is hardly reached, is a claim from one party to the other. Parties can choose to settle or a claim can transform into a dispute. A dispute is a conflict, which involves a third party to find a solution. The first step is to escalate conflicts from project level to firm level. Only when authorities of both firms cannot find a solution, mediation or arbitration will be used (de Heer-de Lange et al., 2013). Arbitration and mediation are alternative dispute resolution (ADR) methods and both nonbinding resolution methods. The general terms of the contract will prescribe one of latter options. In most general terms of contracts arbitration via the “Raad van Arbitrage in the Bouw” is prescribed (M. Chao-Duivis, 2012). One or multiple arbiters, who are certified to judge the disputes, give nonbinding advice. It is strongly recommended to follow up their advice. If both parties agree to decline the advice, deviation of the arbiters’ judgement is possible. However the alternative is litigation, where the procedures are relatively costly. When firms choose mediation as ADR a third (external) party will facilitate the discussion to find a solution. When ADR is not enough to satisfy both parties, litigation is the final step. A judge will give a

binding resolution. The procedure will not only be costly, but could also cost a lot of time, which may delay the process. Figure 5 gives an overview of the steps from conflict to dispute and the possible resolution methods.

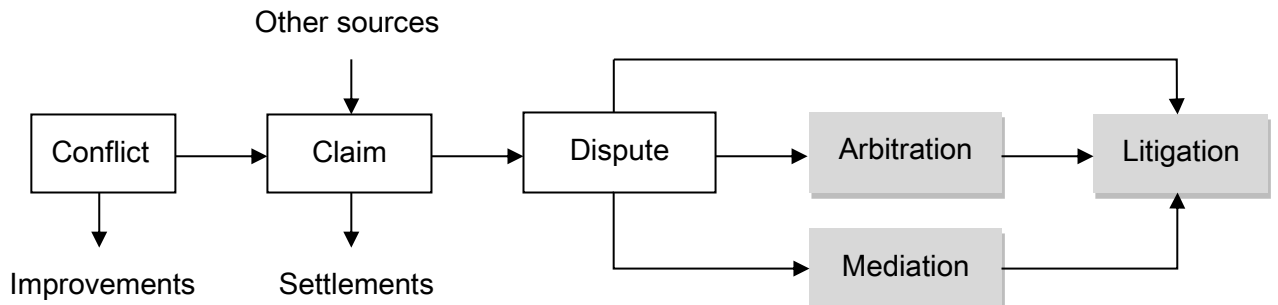


Figure 5: Process model from conflict to litigation (Kumaraswamy, 1997; Chao Duvis, 2012; Ng et al. 2007)

### 1.3 Social relevance and urgency

In 2016, 6.9 billion euro is reserved for the planning and execution of infrastructure projects in the Netherlands (Groot, 2015). The forecast for 2020 states this will increase to 7.2 billion euro. The GDP in 2016 is forecasted at 729.07 billion euro, meaning that the infrastructure costs are approximately 1.02% of the total GDP in the Netherlands (Trading Economics, 2016). The failure costs of those investments is yearly around 10% according to research of USP Marketing Consultancy BV in 2009 (Busker, 2009). Failure costs are relatively high in the infrastructure sector compared to other sectors. Infrastructure projects are financed by public authorities, which increases the importance to minimize those costs (Bouwend Nederland, 2012).

The additional costs are not the only disadvantages of unresolved conflicts; the wasted time and resulting poor cooperation can provoke poor project performance (Cheung and Yiu, 2006). This poor project performance and cooperation could thereby lead to so called “vechtcontracten” (Roijen, 2015), which is a current problem for the client(s) as well as the contractor(s). Subsequently poor project performance should be minimized as it is financed by public money and people have benefit from high quality outcomes.

### 1.4 Problem statement

While conflicts are inevitable in some situations in the construction climate according to S.O. Cheung and Yiu (2006), they do have negative financial and organisational consequences (Mitkus & Mitkus, 2014). The negative financial consequences are mainly caused by the litigation costs when juridical procedures are used and the delay of the project completion (Cakmak & Cakmak, 2014). Delay could turn into penalties for the contractor, but also



require more direct costs for the project itself. Organisational consequences are undesirable, because it limits the group performance and stimulates distrust between client and contractor (Mele, 2011). Distrust has a negative impact on the information processing ability. Parties will become more suspicious and tend to withhold information, but will also focus on the conflict instead of the project itself. Subsequently it stimulates a hostile environment during the further execution of the project (Kadefors, 2004).

The first moment of interaction between client and contractor has a large effect on the further collaboration during the project and thus has a high potential to stimulate better collaboration during the project (Kamminga & Smits, 2012). The current juridical regulations and procurement environment do not promote the quality of the relation (Kerkhove & Vanhoucke, 2016). The competitive aspect during the tender phase, where multiple contractors bid for a tender, and the formal procedures stimulate restraining information out of anxiety to favour one contractor above another. A collaborative environment cannot be expected when a competitive procurement has caused opposing interests of both parties. There are thus several paradigms on collaboration of clients and contractors during the execution of a project. Firstly, the existing competitive procurement method in contrast to the wish for a collaborative environment. Second, the wish to align the objectives of the contractor and the client, while the incentives of both parties are completely different. Thirdly, the wish for collaboration, while the relation between contractor and client is unequal, because the financial transaction of the client to the contractor.

Thus conflicts have a negative impact on the project costs, relation between client and contractor, information processing, time deadlines and could evolve in an iterative process were a hostile environment results in even more conflicts. The pre-contractual phase includes opportunities for improvement as it is the first contact between client and contractor and influences the collaboration in a later stage. This research will investigate if root causes of conflicts could be eliminated during the pre-contractual phase.

## 1.5 Research questions

The research objective of this research is making adjustments to the pre-contractual phase to prevent contractual conflicts by analysing the conflicts occurring during the execution of the projects. The analysis on conflicts causes should shape the problem and better align the prevention methods with the actual origin of conflicts. As the procurement phase is strictly organised through Dutch civil law, the scope is limited to Dutch infrastructure projects. As infrastructure projects are mostly procured to public clients, projects with private clients will

be excluded from the research. Thus, the scope is limited to Dutch infrastructure projects of public clients and to possible prevention strategies in the pre-contractual phase. The phases after the pre-contractual phases are discussed elaborately in literature and are less determinative in terms of the collaborative attitudes of both parties (Kamminga & Smits, 2012).

This research is structured in three different parts, where each part is responsible for a range of questions. The overlapping main question is:

---

*How to prevent contractual conflicts between client and contractor during infrastructure projects before the contract is signed?*

---

The first part will focus on the causes of these conflicts to increase the understanding of the problem.

**Subquestion 1: What are the root-causes of contractual conflicts between client and contractor?**

- a. What are possible root-causes of contractual conflicts?
- b. Which causes originate in the preparation phase?
- c. Are there causalities between the contract strategy of projects and the type of conflicts?

**Subquestion 2: What are possible adjustments during the determination of the contract strategy in order to minimize the probability of conflicts?**

- a. How does the client determine his contract strategy?
- b. Which prevention methods do exist in literature to minimize the probability of conflicts?
- c. What could be additional countermeasures to minimize the probability of conflicts?

**Subquestion 3: Are those existing and additional prevention techniques effective in the current infrastructure projects?**

- a. Does the application of those techniques result in fewer conflicts?
- b. Can the techniques be incorporated in each contract strategy?
- c. Are there any legal, organisation or behaviour limits to their application?

## 1.6 Reading guide

This report consists of nine chapters and some additional appendices. The main text starts with this chapter: an introduction on the subject. The second chapter Methodology will elaborate on the research structure and the content of research methodologies. It explains the taken steps during this research with the aim to find answers for the above research questions. Chapter 3 describes the outcome of the literature research to conflict causes and conflict prevention methods. The fourth chapter explains the research approach of the practical interviews. The results of these interviews are presented in Chapter 5: Results. The interpretation of the results and discussion is described in Chapter 6. Chapter 7 elaborates on the validation of the results through case studies and simulation games. Chapter 8: Conclusion elaborates on the conclusions of this research and will give answers to the research question, named in the paragraph above. In chapter 9 limitations of the research, recommendations for further research are summarized to expand this research and remarks for the practical implications of the outcomes of the research.

# 2.

## Methodology

*'The most significant decision the researcher has to make when constructing a technical research design is what kind of approach will be taken, i.e. which kind of strategy to follow'*

- Verschuren and Doorewaard (2010) p. 155

This chapter will describe the used methodologies during the research. It is divided in three different parts, as their contribution to the research is distinctive. Part A and B are parallel executed and will contain a desk research and a field research. Part C will start after part A and B are completed and will only contain field work. Part A aims to identify the causes of conflicts in construction projects, while the part B will focus on the existing conflict prevention methods. These parts combined will be the input for the conceptual model. Thereafter part C will test the conceptual model and validate the end result; the Process Framework. The following objectives will be discussed:

- Research methodologies to identify conflict causes (*paragraph 2.1*)
- Research methodologies to define conflict prevention methods (*paragraph 2.2*)
- Methodologies to validate final process framework (*paragraph 2.3*)
- Theory on used methodologies (Q-methodology, network analysis, PSG)

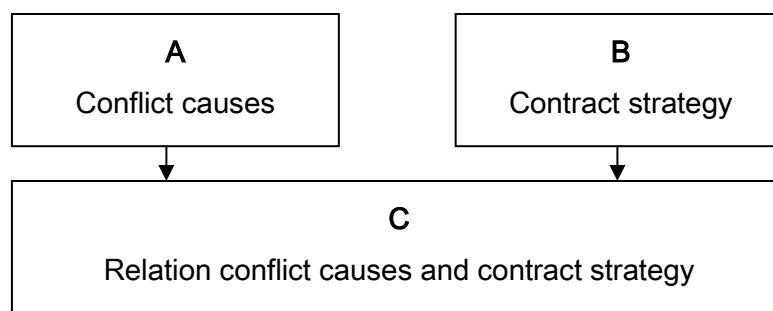


Figure 6: Overview parts research design

## 2.1 Part A: Identify conflict causes

This part consists of a theoretical part and a practical part. The combination provides the researcher more precise input for the establishment of the conceptual model. The theoretical part consists of a desk research, where a literature research endorses the adaptation of existing theories on conflict causes. A practical research is added to prioritise the several conflict causes. As conflicts are considered as a sensitive objective, the researcher is suspicious if enough essential knowledge can be obtained from only a literature research. Besides the literature will be more international oriented, a focus on the Dutch market during the interviews will be of additional value and could deviate from the found conflict causes in literature. The gathered data should give answer to the question: What are the main causes of conflicts of infrastructure projects? The Q-methodology is qualified to answer this question as it systematically analysis opinions, which is further described in paragraph 2.1.2.

### 2.1.1 Literature research

The first step of the research is conducting a desk research. The aim of this literature review is to gather knowledge about the research objectives and the existing literature on the subject. This provides insight in the proposed added value of this research to the academic field and adopts knowledge of the already investigated subjects (Tranfield, Denyer, & Smart, 2003). The search objectives are summed in Table 1. Objectives are placed horizontally and their synonyms vertically. This first orientation provides the input for the Q-study, a long list of potential conflict causes and theory on the several kinds of causes.

Table 1: Search terms literature research part A

Search terms literature study		
<i>Conflict</i>	<i>Causes</i>	<i>Infrastructure projects</i>
<i>Disputes</i>	<i>Root-causes</i>	<i>Public projects</i>
<i>Claims</i>	<i>Sources</i>	
	<i>Triggers</i>	

### 2.1.2 Theory on Q-methodology

The Q-methodology(QM) is a methodology, which aims to study subjectively systematically (Brown, 1993). It is a way to measure the clustering of subjective views on a topic with a statistical grounding. It is developed by William Stephenson in the 1930s to bring a scientific framework for subjective issues (McKeown & Thomas, 2013). The attractive combination of qualitative and quantitative research will provide an analytical insight into the different views

on conflict causes, without underestimating the additional arguments interviewees could give regarding these causes. Krueger et al. (2001) describes this with the following quote: *“Certain situations call for a tool that combines the richness of interviews with the standardization of a survey.”* (Krueger, Casey, Donner, Kirsch, & Maack, 2001, p. 24)

A special characteristic of the QM is that the respondents are the variables, not the test itself (Brown, 1993; Coogan & Herrington, 2011; McKeown & Thomas, 2013). Their background and underlying arguments of their choices are of equal importance as their selection of the statements. The focus on finding a correlation between characteristics of respondents and their opinions further endorse the previous statement. However, the purpose of QM is not to examine the respondents, but only to sort their opinions (Coogan & Herrington, 2011). Therefore it is of excessive importance to carefully select the respondents and make sure they have overlapping factors as well as contradictory aspects. The QM consists of four steps (Brown, 1993; McKeown & Thomas, 2013):

- I. Define statements from the “concourse” (Q-sample)
- II. Selecting the respondents (P-sample)
- III. Factor analysis/cluster analysis
- IV. Subjective representation of views (SRV's)

### Step 1: Defining the statements from the concourse (Q-sample)

The concourse is the name researchers of QM use to identify the total range of views on a particular topic (Brown, 1993; Coogan & Herrington, 2011; Kampen & Tamas, 2013; McKeown & Thomas, 2013). The range of views can be gathered by different means. Relevant literature on a topic provides a sufficient range of the views (Coogan & Herrington, 2011), but interviews with experts or participants are also widely recognised as input. *Completeness* of the concourse is the main criteria for the composition of the concourse (Brown, 1993; Coogan & Herrington, 2011; Kampen & Tamas, 2013; Krueger et al., 2001).

The number of statements has to be limited to a number that does not create a cognitive burden for the respondents (Myers, 2013). This is approximately 20-50 statements. The *comprehensiveness* of those statements should be close to that of the concourse (Brown, 1993). They have to *represent* the total concourse sufficiently (Kampen & Tamas, 2013). This could be achieved by categorizing the statements and represent an equal amount of statements per category (McKeown & Thomas, 2013; Myers, 2013). When limiting the statements per category, Krueger et al. (2001) recommends *avoiding extreme statements*.

These statements will score extremely positive or negative compared to other statements. When the first draft of statements is established an additional pilot should be executed to exclude ambiguous statements or overlapping statements. The final version of statements should be *parallel in style* and *scaled* to guarantee the *clarity* of the Q-sample.

The total amount of selected statements is called the Q-sample. The statements should be possible answers to an overarching question; the umbrella question. This umbrella question is a general question, where all the statements are possible answers to. The following example illustrates the formulation of the umbrella question, with the corresponding statements.

An umbrella question could be: *A thesis is successful...*

The corresponding statements could be:

1. *when the grade is sufficient*
2. *when a publication is placed in a relevant paper*
3. *when completed in time*
4. *when the research company is satisfied*

A summation of the above named requirements regarding the Q-sample is:

- **Completeness** of the concourse
- **Comprehensiveness**: the statements should represent the concourse
- Avoid extreme statements
- **Clarity**: The statements should be parallel in style and scaled

## Step 2: Collecting the P-Sample

The P-sample is the total random sampling of the statements by the respondents. The appropriate number of respondents could vary from 10-100, but the mean according to the study of Kampen and Tamas (2013) is around 50. Selecting the respondents is an essential part of the QM. The respondents should have different backgrounds as well as representing company, work experience, gender etc. The respondents have to order the statements of the Q-sample in a normal distribution with a given scale, from most disagree till most agree. This will be illustrated with the example used in the previous paragraph. The numbers correspond with the numbers given in the example.



Disagree	Respondent A	Agree
3	4	1
	2	

Disagree	Respondent B	Agree
2	3	1
	4	

**Figure 7: Example distribution statements by two respondents**

This should be done by multiple respondents. For this example the respondents could be students, academic teachers, professors or representatives of research companies interested in the research. It is highly recommended to instruct the respondents extensively and guide them through the process (Krueger et al., 2001). During the process respondents should be asked why they agree or disagree with certain statements. This provides background information on the choices behind their distribution.

### Step 3: Analysis of results

The third step is the data analysis behind this method. This implies the clustering of results and find correlations between factors of respondents and the score of the statements. First, the correlation between the respondents should be calculated (McKeown & Thomas, 2013). The formulation of that correlation is:

$$r = 1 - (\sum D^2 / \sum S_n^2 * \sum S_m^2)$$

where:

r = correlation

D = discrepancy between the scores of statements

S<sub>n</sub> = Score of statement given by respondent n

S<sub>m</sub> = Score of statement given by respondent m

The correlation of respondents is not that interesting as QM aims to find correlations between the several identified perspectives, but it gives a first proper indication of the total spectrum of opinions. The significance of the correlation depends on the standard error (SE) of the total Q-sort. The formula of the standard error is:

$$SE = 1/\sqrt{n}$$

n = number of statements

The correlation is significant at the  $p \leq \pm 0,01$  level when the correlation  $\geq \pm 2,58 * SE$

The correlation is significant at the  $p \leq \pm 0,05$  level when the correlation  $\geq \pm 1,96 * SE$

### Factor analysis

The factor analysis is the second part of data analysis of the QM. It should cluster the opinions of the respondents into factors. There are two possible methods; centroid analysis and principal components (Brown, 1993; Krueger et al., 2001; McKeown & Thomas, 2013; Myers, 2013). The difference is negligible according to McKeown and Thomas (2013). The principal components analysis calculates the eigenvalues of the possible factors, which helps to determine the total amount of factors. Eigenvalues higher than 1,00 are significant factors. For the interpretation of the factors, the number of factors should be limited to increase the usability of the analysis.

The factor analysis can be done with a software program. Software program PQmethod is a software program, which is advised by several scholars as reliable program (Coogan & Herrington, 2011; Myers, 2013). It randomly selects eight factors. The correlation of a respondent to a factor determines the contribution of the respondent to a factor. The significance is the same as stated above. Factors without significant correlation of respondents can be excluded from the analysis. Through rotation of the factors the correlation of the respondents to factors can be increased or decreased. The researcher decides how to execute the rotation (Brown, 1993; Krueger et al., 2001). Conducting multiple rotations and comparing the correlation could help to choose the right distribution of factors. The Varimax rotation is mostly used among practitioners and available in the software program named above (Krueger et al., 2001; McKeown & Thomas, 2013). The following guidelines should be used to conduct a factor analysis:

#### Guidelines for rotation of factors:

- Maximize the value of a respondent on one factor, with near-zero loadings on the other.
- Compose a limited number of factors (3-5), depending on the eigenvalues and correlations of the respondents

- Minimize non-contributors to factors (respondents with a correlation lower than  $1,96 * SE$ )
- Minimize respondents corresponding to multiple factors (hybrid loaders)

#### Step 4: Subjective representation of views (SRV's); *Scoring the factors*

The factors will be scored according to their weightfactors and the score on the statements. The result is a distribution of statements, unique per factor. The weightfactors determine the weight of each respondent to the particular factor. With these weightfactors the distribution of statements of a factor can be derived (Krueger et al., 2001; McKeown & Thomas, 2013). The formula for the weightfactor is:

$$w = f/(1-f^2)$$

where:

w = weightfactor

f = factorloadings

The formula for the factor score is:

$$Z_m = \sum (w_n * s_n)$$

A factor is accepted, when the following conditions are met:

1. A factor includes at least two significant contributors (significant correlation)
2. The product of the two highest contributors  $\geq 2 * SE$  (Humphrey's rule).

This Q-methodology is thus a statistical method, which quantifies qualitative data. It starts with defining the concourse and deriving relevant statements for the Q-sample. These statements give answer to an umbrella question. Subsequently the P-sample will be composed, consisting of the selection of statements by the selected respondents. The data analysis is executed through a factor analysis. This will determine the multiple perspectives called factors, on the research objective. These factors represent a group of respondents with a significant loading on the factor.

#### 2.1.3 Q-methodology on conflict causes

The Q-methodology is chosen to investigate predominantly a prioritisation of causes. Additionally the distribution of the interviewees along the factors is relevant to analyse the differences per project-role (client, contractor and consultant). The literature research will result in a list of potential causes, were limitation is necessary to obtain a workable outcome.

Additionally the similarities between the contributors per factor could provide insight into the background of the respondents on several perspectives. The umbrella question of this Q-sort will be:

***If a conflict occurs between client and contractor during the contractual phase of project, this is mostly caused by..***

The amount of statements depends on the variety of the concourse, as the comprehensiveness and completeness should be guaranteed. The respondents should have experienced multiple projects to have enough knowledge on several conflicts. The identification of the most named conflict causes aims at finding aligned prevention methods for these causes. An all-embracing view is necessary to find the combinations of prevention methods and causes, which will be acknowledged by both client and contractors. The respondents should thus contain views of the client as well as that of the contractors. As consultants are involved during the pre-contractual and contractual phase, both at the client and contractors, they are also incorporated as potential respondents. They form an interesting group with a helicopter perspective on these conflicts.

#### **2.1.4 Network analysis to interrelations conflict causes**

*'The behaviour of the complex, real world is a continuous, dynamic flow, which can only be explained in causal terms after its decomposition into discrete events'(Rasmussen, Nixon, & Warner, 1990, p. 451)*

The results of the Q-methodology will provide an insight into the different perspectives on conflict causes. However to visualize the suggested behaviour, a further decomposition is necessary. The decomposition will be conducted by coding the interviews of the respondents. The respondents will discuss the most extreme scored statements, which will result in possible explanations. The analysis of these explanations provides additional insight into causalities between root-causes and conflicts. The goal of the network analysis is to identify those causalities.

The program Atlas.ti will be used to analyse the interviews. The discussed causes will be identified with codes that correspond to the reasoning behind these causes starting with the root-cause. The interrelation between these codes is outlined with the following verbs: support, explains, discusses, expands, is continued by, contradicts, criticizes and justifies.

Part A data analysis will thus result in the derived perspectives by the factor analysis of the QM and the identification of root-causes by the network analysis.

## 2.2 Part B Contract strategy: define conflict prevention methods

### 2.2.1 Literature research

A systematic literature search has to be replicable, scientific and transparent (Tranfield et al., 2003). Therefore a documentation of the used approach is expedient. The first used search terms, with their synonyms, will provide a presumable list of articles, books, conference papers etc. The selection will be based on the titles and abstracts of those sources. The sources should thereby be accessible at TU Delft for practical reasons. The search objectives are shown in Table 2. This literature research should provide inside into considerations during the determination of the contract strategy. Subsequently it should provide a list of potential prevention techniques or methods for conflicts during the contractual phase.

**Table 2: Search terms literature research part B**

Search terms literature study		
<i>Conflict prevention</i>	<i>Contract strategy</i>	<i>Infrastructure projects</i>
<i>Dispute prevention</i>	<i>Procurement</i>	<i>Public projects</i>
<i>Claim prevention</i>	<i>Pre-contractual phase</i>	

### Classification of the prevention methods

The later established conceptual model will combine the theory on conflict causes with the prevention methods existing in current literature. Therefore the processing of information on prevention methods should be structured in a way, that connects with the outcome of the research to conflict causes. The prospected outcome of the conflict cause analysis is an indication of most common causes of conflicts. The prevention methods should be selected based on their effectiveness for a common cause. A general division of the prevention methods based on their basic values should be made. A predefined categorisation of the prevention methods is thus not preferred, rather it should be flexible and aligned with the outcome of the results to conflict causes. The first classification of the prevention methods is based on their underlying theory. The further alignment with the conflict causes will follow the analysis of the conflict causes.

## 2.2.2 Interviews

The previous two steps are based on current literature. This step incorporates the perspectives of respondents on current practices of conflict prevention. The interviews accompanying the Q-sort, will also be used to gather information on prevention methods used in practice. These are then incorporated in the list of possible prevention methods/techniques. These additional methods will also be classified based on the outcome of the analysis on conflict causes. The analysis of the current used prevention methods and their experience on prevention methods will be the input for the conceptual model.

## 2.3 Part C: Design Process Framework

Part A results in perspectives on conflict causes and an explanation why those causes results into conflicts. Part B results in an overview of possible prevention methods and theory on contract strategy. When both analyses are conducted the two parts should be connected. The conflict root-causes should be related with possible prevention methods, suitable for those situations. The possible solutions for these conflicting sources are input for the conceptual model.

### 2.3.1 Test conceptual model: Case study & simulation games

The case studies should identify if the causalities named in the conceptual model are valid and if these causalities work in practise. Therefore projects will be analysed on different aspects. (1)The amount of conflicts, (2) the type of conflicts and (3) the applied prevention methods. The number of case studies is therefore uncertain as it depends on the outcome of conceptual model and the possible matches with the case studies. The number of combinations between conflicts and prevention techniques depends on how many case studies are sufficient. The case studies should cover these combinations.

The interviews with the contract managers and project managers of these cases will give insight into the methods used to prevent conflicts and the effect of other possible solutions. If the prevention techniques have not been applied in earlier projects, questions will focus on the possibility of incorporating a prevention theory and which effect these methods would have had in these projects.

### Theory on simulation games

Participatory simulation game (PSG) is a way to evaluate the decision choices of the participants. It generates information about the behaviour of the agents in the simulation game (Anand, Meijer, Duin, Tavasszy, & Meijer, 2016). According to the theory of Rao and

Georgeff (1995) agents behave according to the Belief, Desire and Intention mental attitudes. Belief stands for the information state of the agents about the environment. The environment consists of a set of changing conditions over time and the way those conditions are retrieved. The Desire attitude represents the motivational state of the agents, indicating the priorities of the given objectives. The wished actions and procedures over time and the accomplished objectives over time determine the Desire-attitude. The deliberative output of the selected action is called the Intention attitude. Thus, given certain information the agent has his **beliefs** about the system. Considering the possible actions and conditions during the simulation game will determine his **desire**. The final chosen path is called his **intention** (Rao & Georgeff, 1995).

The different attitudes of the participants are pictured in Figure 8. The chosen path of the agent is determined for the outcome of the simulation. The information given to the players of the simulation game will be based on the results of the combination of the results of Part 1 and Part 2. This will consist of  $n$  root-causes and  $n$  possible prevention methods. Two simulation sessions are necessary to test the prevention methods. During the first session the players have no information about possible prevention methods, while the second session does include information about possible prevention methods. The outcome of the first session will tell something about the identified root-causes. The difference between the first and the second session will provide insight into the effectiveness of the prevention methods. The priorities of the given information and the desired accomplishments should be written down by the players before starting the game. The difference between the desire and the intention tells something about the considerations of the players during the game and their interaction.

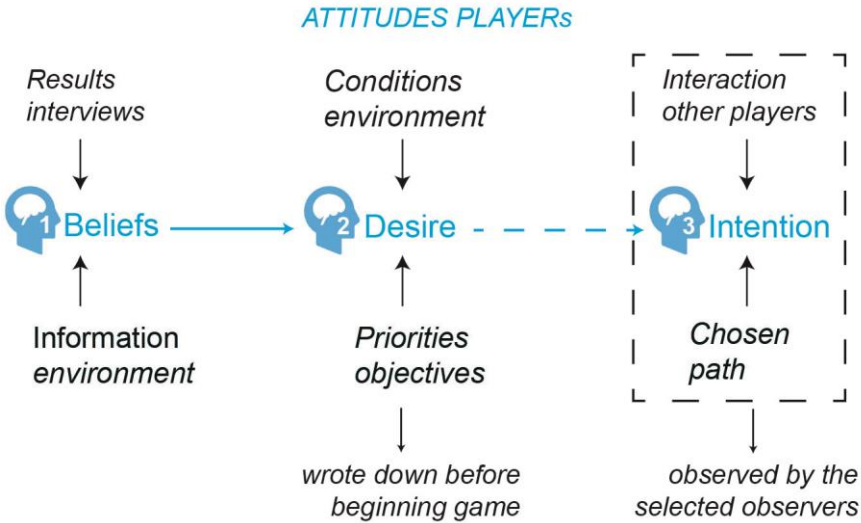


Figure 8: Player's attitudes during PSG

### **Step 1: Evaluate case studies & simulation games and define final process framework**

The case studies combined with the interviews should test the conceptual model. Testing the conceptual model will result in a process framework. The combinations, which are positively reflected during the case studies and interviews, will be incorporated in the framework. The negatively received combinations will be excluded of the framework. Iteration to the conceptual model is possible when necessary.

### **Step 2: Validate process framework met external experts**

The validation sessions have the purpose to validate the results of the case studies and thereby the process framework. The validation sessions will be held with experts to validate the results. The sessions consist of a presentation of the process framework. Their comments on the process framework and the additional discussion provide (Jones & Deckro, 1993) the final accents on the process framework.

## **2.4 Conclusion methodology**

The research design consists of three parts, executed in four phases. First, two parts are investigated synchronically to conflict causes and conflict prevention methods. Subsequently the relation between those parts will be investigated in the third part. The phases are a chronical representation of the research steps. The first phase consists of a literature research to the existing knowledge pertaining to the first parts. The second phase has two boxes named interviews, representing the two different interview approaches, which both are conducted during one interview. Data analysis is done during the third phase. The factor analysis and interviews of Part B are based on the Q-Methodology, which aims to study subjective objectives systematically. The last phase, phase four, is the validation of the process framework. In short, the research consists of the following parts referring to goals of the research:

- Part A: Identify conflict causes
- Part B: Define prevention methods
- Part C: Relation conflict causes and prevention methods

Therefore the following phases are executed chronically, which relate to the taken steps during the research:

- Phase 1: Literature research to conflict causes, contract strategy and conflict prevention



- Phase 2: Gathering data through conducting interviews
- Phase 3 Data analysis
- Phase 4: Validation of the conceptual model

Figure 9 pictured the research structure.

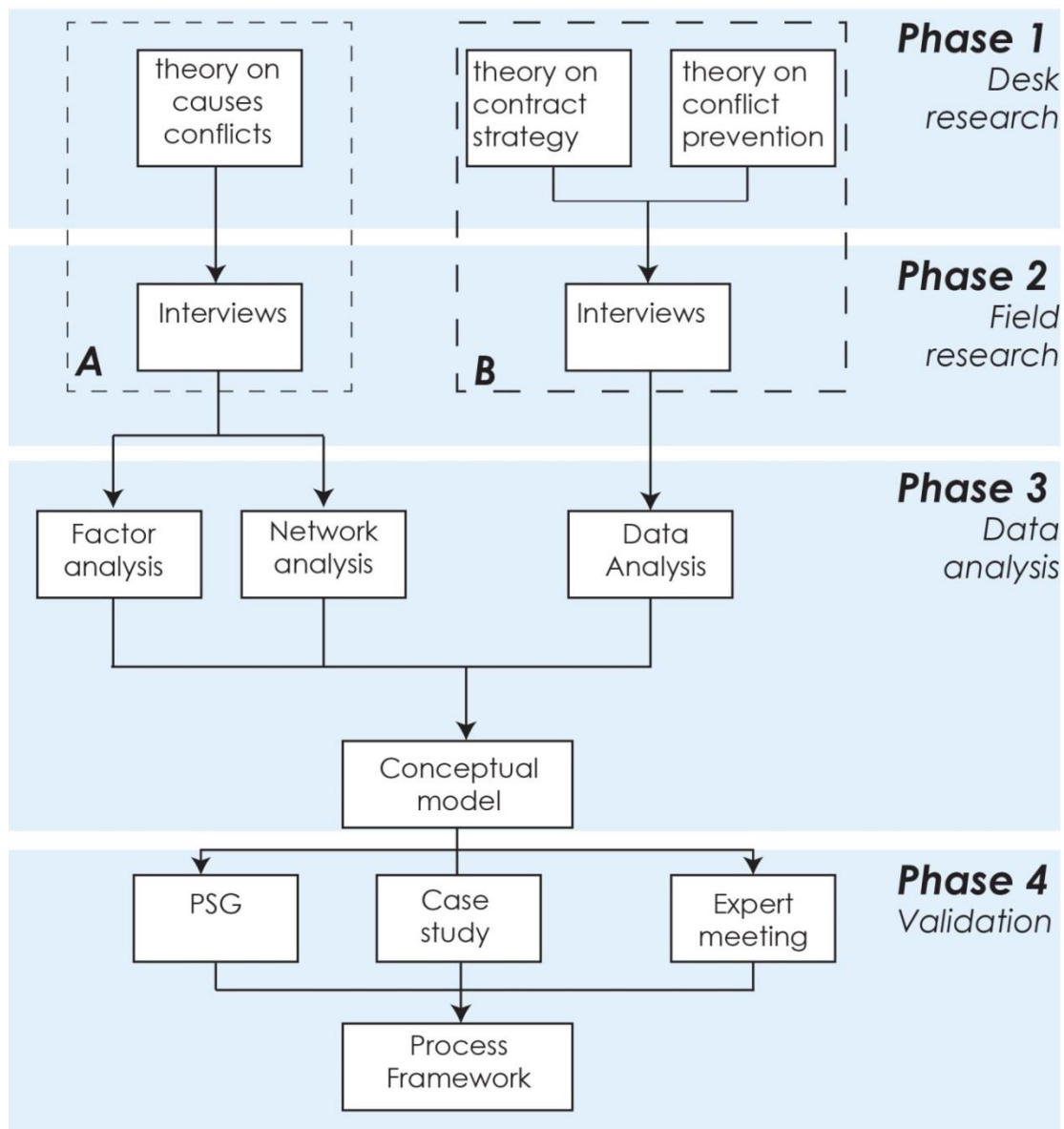


Figure 9: Research design



# 3.

## Literature research

This literature research will elaborate on the existing knowledge on conflict causes and conflict prevention, which will provide the basic theoretical framework for this research. It is structured in two sub-paragraphs, corresponding with the two-part research design. The first part starts with the definition of conflicts used in this research and elaborates on the existing literature on conflict causes between client and contractor within infrastructure projects. The research on contract strategy introduces two contract strategy styles, followed by conflict prevention suggestions based on these styles. The following sub-questions will be answered:

### Part A

*1a. What are possible root-causes of conflicts?*

*1b. Which causes originate in the pre-contractual phase?*

### Part B

*2a. How does the client determine his contract strategy?*

*2b. Which prevention methods do exist in literature to minimize the probability of conflicts?*

## Part 1: Conflicts and conflict causes of infrastructure projects

### 3.1.1 Definition conflict

Originally conflict is a substitute of the Latin word *conflictus* meaning 'clash' (Mele, 2011). It can be subdivided in several subcategories i.e: intrapersonal, interpersonal, intraorganisational, interorganisational, intragroup and intergroup. Intergroup conflicts are different from inter-organisational conflicts as they entail all group conflicts also within organisations. Inter-organisational conflicts are distinctive as the relation between the organisations is mostly formalized by a contract or mutual agreement, where conflicts could evolve in formal procedures and consequences (Jones & Deckro, 1993). As the scope of this research is bounded to conflicts between clients and contractors, inter-organisational conflicts are described by the term conflict in this further research.

In literature several definitions are given for the term conflict. Demeyere (2014) defines a conflict as a discord between two different parties, whereby party A enforces party B to adopt his opinion and party B refuses this. It is not seen as a conflict, when B assumes the opinion of A. Ongori (2009) has somehow the same definition, but stipulates the frustration or blockage during a conflict due to different goals, interests or values by the affected organisation. A rather short, but more outspoken definition is given by Deutsch (1973), conflicts are incompatible activities. Wall and Callister (1995) add a term to these definitions by stating the perception of parties is an important aspect for conflicts. The perception of those parties during a conflict sensitive situation is determined for the escalation of the situation into a conflict. Inter-organisational conflicts are thus distinctive by the following aspects:

- Blockage of a forced imposed opinion by one organisation to the other
- Frustration of the involved organisations towards each other
- Incompatible situation
- The perception of the conflict by the organisations influences the further escalation

The Construction Industry Institute (1995) has a more applied definition to this research: “A conflict is a disagreement between the parties that cannot be resolved by the on-site project managers” (McGeorge & London, 2014). This latter description is chosen as definition for this research as it addresses the negative side of a conflict, whereby the assigned people on the project are not able to resolve the problem. They have to escalate the conflict either within the organisations or invite an external organisation. When external organisations are necessary to resolve the conflict, this may result in a lower efficiency (Vaaland, 2004). Since the invested time in the conflict cannot be invested in the project itself. The cost could increase incrementally, when expensive mediators are hired or a costly litigation is started.

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*Definition conflict*

***“A conflict is a disagreement between the parties that cannot be resolved by the on-site project managers” (The construction Industry Institute, 1995)***

### **3.1.2 Conflict causes in infrastructure projects**

One of the main purposes of the literature study into conflict causes is the identification of possible root-causes of conflict of infrastructure projects. Therefore the following search terms are used: conflict, dispute, conflict causes in combination with infrastructure or civil

projects. The articles should contain theory on conflict or dispute causes within the infrastructure sector. Based on the titles the number of articles is narrowed down and the abstracts of the residuary articles are read. A selection of twelve articles of different authors on conflict causes in the infrastructure industry is made. Two of those article were literature review articles, which reviewed ten respectively eleven articles.

The process leading to conflicts is analysed by S.O. Cheung and Yiu (2006) and Vaaland and Hakansson (2003). S.O. Cheung and Yiu (2006) separate conflict triggers and the conflict causes itself. Triggering events could be non-performance, payment or time, while the causes could be task interdependency, differentiations, communication obstacles, tensions, personality traits. The probability of a conflict is defined by them as the probability of task interdependency together with differentiations, communication obstacles, tensions and personality traits. This sequential process of emerging conflicts is also acknowledged by Vaaland and Hakansson (2003). They also see it as an interrelated network, where a single situation will not cause a conflict, but do not define it as triggers and causes. They describe a five-stage process, starting with a latent conflict caused by scarce resources, drives for autonomy and opposing goals; the ingredients for a conflict (see 1.2 Conflicts in infrastructure projects). Misunderstanding and the personalization of conflicts are stage two and three, which could provoke the manifest conflict. This is named as stage four, which corresponds to the definition of conflict for this research. The conflict cannot be solved by the on-site project managers and alternative dispute resolution methods or litigation is only path leading to a solution. The fifth stage elaborates on the aftermath of a conflict.

The various types of conflicts are distributed in categories by several authors (Cakmak & Cakmak, 2014; S.O. Cheung & Yiu, 2006; Jaffar et al., 2011; Mele, 2011; Peterson & Behfar, 2003). Jaffar et al. (2011) selects three major categories; behaviour problems, contractual problems and technical problems. Behaviour problems include problems with individual's ability and competences, problems based on differences in need and problems based on communication. Cakmak and Cakmak (2014) also name lack of communication as behaviour related conflict causes. Subsequently they add adversarial/controversial culture and a lack of team spirit as conflict cause. Peterson and Behfar (2003) make a distinction between relationship conflicts and task conflicts. Mele (2011) adds process conflicts to those two. Process conflicts are based on "the awareness of controversies about aspects of how task accomplishment will proceed" (Mele, 2011, p. 1378). Relationship conflict causes entail "interpersonal incompatibilities including affective components such as feeling tension and friction" (Mele, 2011, p. 1378).

Task conflict causes are based on the “differences in viewpoints and opinions pertaining to a group task” (Mele, 2011, p. 1378). They have the opportunity to evolve in a positive effect on the organizational structure, while relationship conflicts have mostly negative consequences (Peterson & Behfar, 2003). Task conflicts can contribute to a more efficient organizational structure, where innovation has a higher chance to succeed. In contrast, relationship conflicts have a negative influence on the organizational structures and personal damages can harm the progress (Peterson & Behfar, 2003). The group task named in the definition of Mele (2011) could be interpreted as the general group task of client and contractor; completing a project. In that case the categories of Cakmak and Cakmak (2014) design related and project related are part of the same category. Design errors or quality of design and site conditions and unforeseen changes are examples of design and project related causes. Owner related and contractor related are causes, which could be subdivided in project related causes and process related causes. Variations and changes of scope initiated by the owner are project related causes, while the cause ‘unrealistic expectations’ is a human behavior related cause.

S.O. Cheung and Yiu (2006), Jaffar et al. (2011) and Cakmak and Cakmak (2014) all appoint contractual related causes as a distinctive category. Ambiguities in contract terms, contract interpretation and amount of official documents may lead to conflicts. Sai On Cheung, Yiu, and Chiu (2009) name unfavorable past experience together with ambiguous contract terms and difficulties in performing contracts as possible cause of a hostile atmosphere.

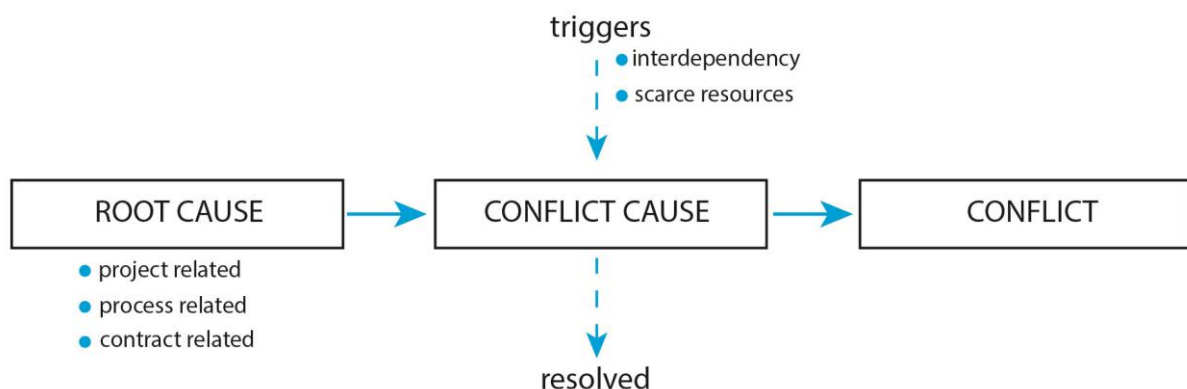


Figure 10: Structure conflicts

Categorisation root causes:

- **Project related causes:** Differences in perception with respect to the project tasks
- **Process related causes:** Differences in perception with respect to the way the project tasks are accomplished
- **Contract related causes:** Differences in perception with respect to the juridical procedures related to the project tasks

The literature research to conflict causes resulted in a list of possible causes of conflicts, varying from project related causes, process related causes and contract related causes. The total sum of possible causes out of this literature research results in 103 causes. A workable list of 32 causes for the Q-sort is based on the times cited and the representation of several fields within the categories. The reduction of causes is described in Chapter 4 Analysis.

### 3.2 Part B: Contract strategy focused on conflict prevention

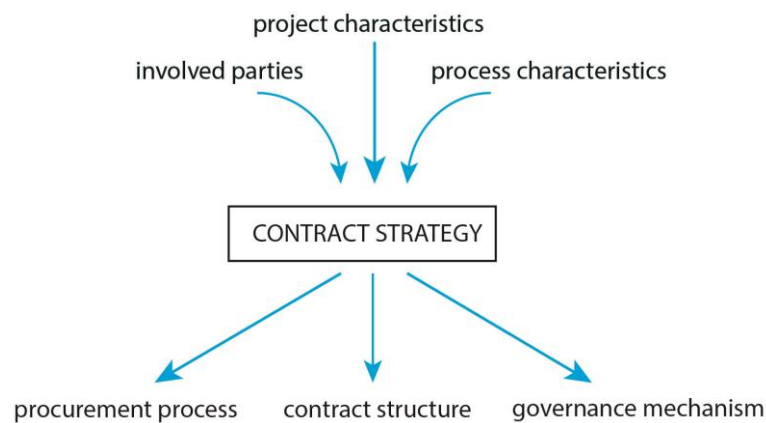
The contract strategy shapes the relationship between client and contractor and is therefore the main focus of this selection of the literature study into possible prevention methods. The contract strategy of a given project will be determined in the pre-contractual phase. The pre-contractual phase consists of four stages; initiation, specification, procurement and award. The contract strategy is a determinative decision during the pre-contractual phase, which will be specified during the initiation and specification. The contract strategy depends on the project characteristics, process characteristics and involved parties (Roelofs & Reinderink, 2005). In general, project characteristics entail the lifecycle and complexity of a project. This will largely determine the preferred type of control and flexibility the client chooses to incorporate in the contract as well as the duration of the contract. The process characteristics and the associated risks influence the chosen distribution of responsibilities, liabilities and authorities in the contract plus the applied remuneration scheme. The type of the involved parties, their professionalism, qualifications and the current market situation will also contribute to the preferred distribution of responsibilities and risks.

Determining the contract strategy of a project entails besides the contractual policies, the governance structures appropriate to a given project (Elbeltagi, 2009). Formal mechanisms will affect the predetermined patterns of behavior, procedures and the contract, while informal mechanisms should influence the level of trust and ability to improvise and handle the unplanned (Vaaland & Hakansson, 2003). Formal mechanisms are mainly the contract structure itself and the formal aspects of the procurement process. Informal mechanisms are the complementary activities to accomplish agreed-upon tasks (Goles & Chin, 2002).

The formal and informal mechanisms of the contract strategy must comply with the legislation on procurement. Besides the Procurement Law, four principles are directive. The current principles of the procurement regulations are established to secure both parties against unfair competition. First, the principle of equality has the highest priority of all the

principles. The contracting authority has to ensure a level playing field, where every possible contractor has access to the same information. The principle of transparency is the second principle, which entails the obligation of the contracting authority to be open about their decisions. The principle of proportionality, which states the requirements for the selection of the bidders, should be in line with the contract, for example the number and size of reference projects. Finally, the principle of competition states that the tender should invite competition (M. A. B. Chao-Duivis et al., 2013).

Figure 11 pictured the determination of the contract strategy together with the outcome of the contract strategy. The next paragraph describes two different perspectives on contract strategy and the associated conflict prevention methods.



**Figure 11: Contracts strategy determination and implication**

### 3.3 Two different contract strategy approaches

In literature there are mainly two different styles described regarding the approach of client and contractor on the contract strategy. Scholars distinguish collaborative and adversarial attitudes, which insinuate a relatively outspoken division of attitudes (Badenfelt, 2011; Branconi & Loch, 2004; Kadefors, 2004; Kerkhove & Vanhoucke, 2016; Suprpto, Bakker, Mooi, & Hertogh, 2016). Contractor and client either want to collaborate or they enter in a hostile environment. The *conflict of interests* is leading or embraced through these different perspectives. Evaluating this theory led to perception that traditional contracting is based on function specific ways of thinking. The client behaves as public organisation, representing the stakeholder's wishes while the contractor is a private organisation aiming for efficient activities that result in an economic advantage. The client and contractor do not find it necessary to align their interests in order to create a successful project outcome (Muller & Turner, 2005). This is named the **role-oriented approach**; client and contractor act based on their functional roles during the project. The client initiates a project and decides its outline,



which he procures on a competitive market, where the contractor will be selected. The contract engaged the client and the contractor, and then the contractor is in charge of the realisation of the project. The second approach is named the **project-oriented approach**, where the roles of client and contractor are inferior to the project itself. This approach implies that a project requires a collaborative relationship between client and contractor before establishing the contract to result in a successful project outcome.

### 3.3.1 Role-oriented approach

The role-oriented approach is derived from literature on traditional contracting methods and attitudes during procurement. According to this role-oriented approach an effective contract strategy should stimulate the contractor to achieve the clients' objectives (Turner, 2004). The client and contractor have different objectives, values and goals, and will act according to these different objectives, values and goals. If the client wants to ensure his objectives will be achieved, he will have to incorporate incentives for the contractor to fulfil these objectives. The contract is thereby the linking official document, where the client employs a contractor to ensure his project goals will be achieved (Turner, 2004). Branconi and Loch (2004) associate this with lump sum turnkey contracts. Suprpto et al. (2016) mention lump sum contracts and cost reimbursable contracts as traditional contracts, where clients are responsible for the project definition. Depending on the outcome of the project preparation, a single or multiple contractor(s) will be selected through a competitive tendering procedure (Eriksson & Westerberg, 2011). The contractor is thereafter responsible for the project activities and the associated risks. The client depends on the information supply of the contractor on the progress of the projects objectives.

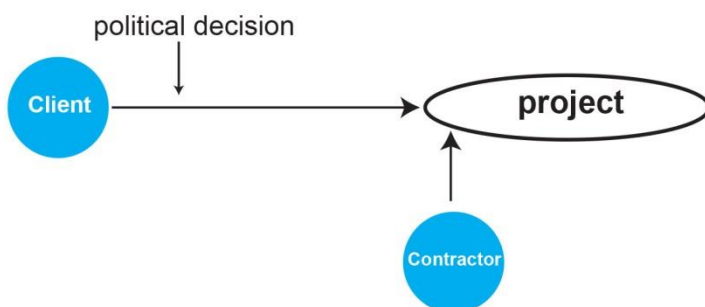


Figure 12: Role-oriented perspective

According to Kadefors (2004) this could have a negative impact as it results in detailed contractual specification and close monitoring. This could evolve into more opposing attitudes, which could result in dissatisfaction or incomprehension. When role-oriented perspectives transform into adversarial attitudes, it could create a hostile environment

vulnerable for conflicts (Eriksson & Westerberg, 2011; Nordin, 2006). This perspective also stimulates the preconceptions about the contractors as being opportunistic and greedy and clients to be distrustful and suspicious (Kadefors, 2004).

### **3.3.1.1 Role-oriented prevention methods**

The vision of role-oriented prevention methods is that client and contractor should both achieve their own tasks as good as possible and that will result in less conflicting situations. The role-oriented prevention methods are based on control of the client to protect the level playing field during the procurement phase. Above that, control-based prevention methods decrease the opportunities of contractors to misuse existing openings for litigations (Kadefors, 2004).

- Client should know as much as possible before entering in a project (site conditions) (Acharya, Lee, & Kim, 2006)
- Ensure fair and complete disclosure of information at an early stage (Roijen, 2015)
- Client should improve their knowledge about contracts and exclude the ambiguous terms in the contracts (Acharya et al., 2006).

### **3.3.2 Project-oriented perspective**

The project-oriented perspective is a merged appellation of the literature on collaborative procurement styles; relational contracting, partnering, innovative tendering and collaborative tendering. 'Best for project' is the slogan associated with this perspective. The project is mainly a political initiation, whereby a collaborative atmosphere between client and contractor is found necessary to specify the project. Client and contractor assume it essential to align their objectives to create a project success. This perspective criticizes the role-oriented perspective, for example by Kadefors (2004). She states that inequality during the procurement process is the first trigger for conflicts during a later stage. During the procurement the client judges the contractor, which immediately stipulates the hierarchical relationship during this process. She warns for a supervisory position of the clients, which stagnates a relationship based on reciprocity and mutual respect. This means that cooperation is a far-sighted goal in the procurement process.

Suprpto (2016b) argues that collaborative attitudes should be the main purpose of a contract strategy, which also differs from the role oriented perspective. The functional roles of client and contractor are inferior to the project goals. Collaborative attitudes should create

openness about interests, values and goals by both parties (Sai On Cheung et al., 2009; Suprpto, 2016b).

The content and structure of the contract expresses the relationship between client and contractor in words and drawings. Turner (2004) argues that the contract should be somehow composed as such that it promotes to act rationally together and achieve next to the client objectives, the common objectives of the client and contractor. This could be jeopardized, when the objectives and remuneration are not aligned. When clients strive for the lowest possible prices, without recognizing the risks or further incentives for the contractor to achieve their objectives, a climate of distrust and conflict is created (Turner, 2004). Thus a contract should counteract the above to prevent conflicts. Relational contracting aims to create such an opposite. It should stimulate collaborative attitudes and positively affect commitment, trust, respect and fairness among the involved parties (Suprpto, 2016b). However relational contracting is a concept without clear predetermined guidelines, but it consists of possible adjustments in the remuneration principle, governance mechanism, incentives and risk sharing scheme (Suprpto, 2016a).

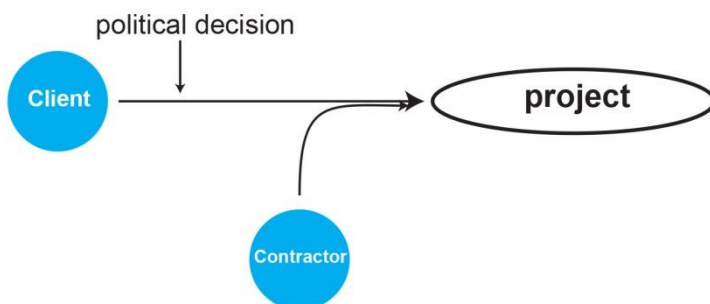


Figure 13: Project-oriented perspective

### 3.3.2.1 Project-oriented prevention methods

Project-oriented prevention methods aim to achieve collaborative attitudes among the contractor and client. Examples of conflict prevention methods are:

- Relational contract structures
- Partnering procurement strategies
- Early contractor involvement

Collaborative relations should establish a win-win game, where the objectives are aligned (Turner, 2004). Relational contract structures aims to achieve collaborative relations, which can be practiced through four objectives (Suprpto, 2016b):

- Remuneration principle
- Governance mechanism
- Incentives
- Risk sharing scheme

### **Remuneration principle**

There are several combinations possible for the remuneration of projects. Lump sum contracts are the most inflexible price driven contracts, which have a high risk on claims (Elbeltagi, 2009). Contracts with cost reimbursable principle is a cost based contract, more flexible to possible changes. Through the addition of fees a client can motivate a contractor to finish within time and reduce his costs, examples are percentage fees or incentive fees (Kerzner, 2003).

### **Governance mechanism**

Ex-ante contractual governance should be well thought through as the project contract will be incomplete. Well ex-ante contractual governance will increase the ability of both parties to deal with unforeseen circumstances. Therefore the following guidelines should be implemented in the governance structure (Turner, 2004):

- Allow adaptations (through mutual agreement)
- Communication structure (progress & problems)
- Resort the law

### **Incentives**

Incentives in contracts results in more commitment for the contractor to fulfil the clients' objectives (Turner, 2004). Kerkhove and Vanhoucke (2016) state incentive clauses are contributing to well performing contract structures, which increased the robustness to changes in the environment.

### **Risk sharing scheme**

Risk allocation is determinant for a projects success (Zaghloul & Hartman, 2003). It is detrimental to transfer an immoderate amount of risks to the contractor, when he is not able to manage those risks (Zaghloul & Hartman, 2003). A risk sharing scheme means client and contractor share their risk document and be cooperative in managing those risks (Ng, Pena-Mora, & Tamaki, 2007).

To sum up the characteristics of Relational contracting:

- Relational contracting is a broad concept, which can be used in every project on its own way.
- **Contract management:** It influences the contract strategy directly
- **Responsibility:** The client should initiate it, but the contractor should cooperate.
- **Type:** It has juridical tools.

*Partnering* aims to establish a collective attitude with commitment, trust and team work (Adnan et al., 2012). The inter organisations processes are thereby improved to aid the projects performance (Adnan et al., 2012). However a lot of processes could be covered by the term partnering according to Broom (2002). This research will only focus on partnering procurement strategies, which include cooperative procurement methods.

According to Thompson and Sanders (1998) individuals should at the highest level of partnering identify themselves with the project team instead of their employer's organisation. The characteristics of the project should determine the appropriate level of partnering, depending on the projects complexity, customization, uncertainty, duration (project size) and time pressure. Eriksson (2010) has summarized the possible procedures and has divided them in three levels. A combination of the different levels is recommended by Eriksson (2010), as each project is unique. Procedures related to competition, which are procedures with a lowest level of partnering, could thus be combined with procedures related to cooperation, which is the highest level of partnering. Procedures related to cooperation involve a medium level of partnering.

**Table 3: Partnering procurement procedures (adopted from Erikson (2008))**

Buying stage	Procedures related to competition	Procedures related to cooperation	Procedures related to cooperation
Specification	<i>By the supplier (or by the client)</i>	<i>Joint specification with one party responsible</i>	<i>Joint specification with shared responsibilities</i>
Bid invitation	<i>Open bid procedure (multiple bids)</i>	<i>Limited bid invitation (a few bids)</i>	<i>Direct negotiation with one bidder</i>
Subcontractor selection	<i>By the contractor (or by the client)</i>	<i>Joint selection with one party responsible</i>	<i>Joint selection with shared responsibilities</i>
Contract formalization	<i>Formal, comprehensive</i>	<i>Formal, comprehensive contracts + relation</i>	<i>Informal, incomplete contracts + relation</i>

		<i>norms</i>	<i>norms</i>
Compensation	<i>Output based (fixed price)</i>	<i>Fixed price and shared profits</i>	<i>Including incentives (shared profits)</i>
Collaborative tools	<i>Low extent</i>	<i>Medium extent (including cooperative benchmarking, aggressive joint objectives)</i>	<i>High extent</i>
Performance evaluation	<i>By the client</i>	<i>Both by client and by supplier</i>	<i>By the supplier</i>

To sum up the characteristics of Partnering:

- It is a culture, including cooperative procedures to realize a collective attitude.
- **Contract management:** It influences the contract strategy directly
- **Responsibility:** The client should initiate it, but the contractor should cooperate.
- **Type:** It has behavioural tools and juridical tools.

*Early contractor involvement (ECI)* is a partnering component, which could also be used on its own. ECI could be integrated during multiple points in the pre-contractual stage. It will be a decision made based on possible risks (complex procedures) and potential revenues (innovation, project control and time benefits) of early involvement of contracts (Valkenburg, Lenferink, Nijsten, & Arts, 2008). The complexity of the procedures is mainly caused by the need for synchronised procedures, where multiple solutions are created and eventually one should be selected. ECI has the aim to optimise the constructability of the design to prevent delays and costs associated with late adjustments to the design or excessive review sessions (Valkenburg et al., 2008). The contractor is involved during the specification of the project, before the project is tendered. This gives also the opportunity to suggest innovative and creative solutions, because the contractor is able to incorporate his knowledge in an earlier stage.

ECI is not suitable for every project. Firstly, the potential benefit should be larger than the bottlenecks of a more complex procedure. Therefore it is mostly more suitable for integrated contracts, where design and construction are part of the potential project. Furthermore should during the planning be room for creative/innovative solutions. Valkenburg et al. (2008) also state that both parties should recognize the benefits of exchanging ideas.

Characteristics of ECI:

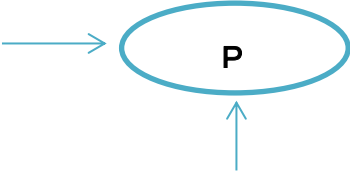

- It could be incorporated during multiple points in time
- It is more applicable to DC(F)(M)(O) contracts than RAW contracts
- **Contract management:** It is part of the tendering strategy
- **Responsibility:** The client should initiate it, but eventually client and contractor are involved
- **Type:** It is a task oriented tool

### 3.4 Conclusion literature research

Conflict causes could be distinguished in three categories; project related causes, process related causes and contract related causes. The subjects of project related causes correspond with the main task during a project; costs, risk, organization, time, information and quality. Process related causes are human behavior related causes, management style causes and communication aspects. These causes are not project specific, but influence the process during a project. Contract related causes include aspects of the juridical documents and procedures during a project.

There are two distinctive approaches during the pre-contractual phase; the role-oriented approach and the project-oriented approach. The role-oriented approach assumes the client is responsible for the preparation of a project and knows what is best for the project. They procure the projects based on a competitive tendering process, where the lowest bid or the economically most advantageous tender will win. The project-oriented approach stipulates that a collaborative attitude early in the pre-contractual phase positively influences the level of collaboration during the contractual phases and minimizes the probability of conflicts from escalating. Table 4 summarizes the theory on the two different approaches.

**Table 4: Overview prevention methods**

Contract strategy	Role-Oriented	Project-oriented
		
<b>Perspective based on</b>	<i>Competition</i>	<i>Collaboration</i>
<b>Key values</b>	<i>Professionality</i> <i>Level playingfield</i>	<i>Openness &amp; Transparency</i> <i>Equality &amp; Fairness</i>
<b>Prevention methods</b>	<i>Control – based</i>	<i>Trust - based</i>

<b>Prevention methods (practical)</b>	<i>Information supply</i> <ul style="list-style-type: none"> <li>• <i>Site conditions</i></li> <li>• <i>Stakeholder agreements</i></li> </ul> <i>Optimise contract</i> <ul style="list-style-type: none"> <li>• <i>Exclude ambiguities</i></li> </ul>	<i>Relational contracting</i> <ul style="list-style-type: none"> <li>• <i>Allow adaptations</i></li> <li>• <i>Communication structure</i></li> <li>• <i>Include incentives</i></li> <li>• <i>Risk sharing</i></li> </ul> <i>Partnering procurement</i> <ul style="list-style-type: none"> <li>• <i>Joint specification, shared responsibilities</i></li> <li>• <i>Informal, incomplete contracts plus relational norms</i></li> </ul> <i>Early contractor involvement</i> <ul style="list-style-type: none"> <li>• <i>Market consultations</i></li> </ul>
<b>Method-owner</b>	<i>Client</i>	<i>Client (initiation) and contractor (active involvement)</i>
<b>Method-goal</b>	<i>Task-oriented</i> <i>Contract-oriented</i>	<i>Behaviour-oriented</i> <i>Contract-oriented</i> <i>Task-oriented</i>

Hypotheses are formulated based on the conclusions of this literature research. Hypotheses 1 and 2 describe the relation between the probability of conflicts and the potential root cause of conflicts. These hypotheses represent Part A of the research to conflict causes. Hypothesis 1 describes the relation between the probability of conflicts and the moment root causes originate. The family of hypotheses 2 describes the relation between the type of root-cause and the probability of conflicts. Hypotheses 3, 4 and 5 describe the relation between the prevention methods and the root-cause and subsequently the relation with the probability of conflicts. These hypotheses represent Part B to conflict prevention methods. The family of hypotheses 3 describes the relation between the means of the prevention methods and the effectiveness on the root-causes. The family of hypothesis 4 and 5 describes the relation between the two approaches on the relation between client and contractor in the pre-contractual phase and the probability of conflicts. Hypotheses 4a and 4b represent the role-oriented approach and hypotheses 5a and 5b the project-oriented approach.



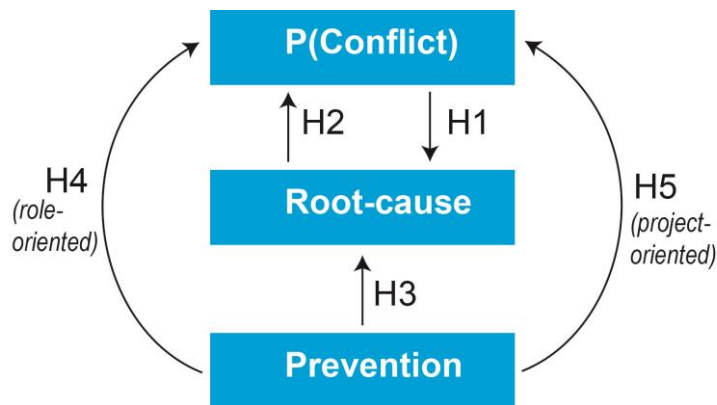


Figure 14: Relations hypotheses

## 3.5 Hypotheses

### Part A Conflict causes

- H1** *The root causes of conflicts originate in the pre-contractual phase as conflicts are a sequential process based on a combination of events.*
- H2a** *Project related factors as information supply, quality, costs, time and risks are root-causes of conflicts.*
- H2b** *Process related factors as human behaviour, management and market structure are root-causes of conflicts*
- H2c** *Contract related factors as the contract structure, juridical procedures and official documents are root-causes of conflicts*

### Part B Conflict prevention methods

- H3a** *Improvements of the procurement processes decrease the probability of conflicts caused by project and process related causes.*
- H3b** *Improvements of the contract structure decrease the probability of conflicts caused by contract related causes.*
- H3c** *Improvements of the governance mechanisms decrease the probability of conflicts caused by process related causes.*
- H4a** *Conflict prevention methods in the pre-contractual phase decrease the probability of conflicts when performed by the client without interference of the contractor.*
- H4b** *Control-based prevention methods as excluding contract ambiguities and improving the information supply, decreases the probability of conflicts during the contractual phase. (role-oriented approach)*
- H5a** *Collaborative attitudes based on openness, common objectives, equality and fairness during the pre-contractual phase of a project decrease the probability of conflicts during the*

*contractual phase.*

**H5b** *Trust-based prevention methods, as relational contract structures, partnering procurement strategies and early contractor involvement, decreases the probability of conflicts during the contractual phase (project-oriented approach).*

# 4.

## Research approach: Conflict causes and conflict prevention

Previous chapter elaborated on the theoretical findings on conflict causes and conflict prevention methods. This chapter will explain the process from these theoretical findings into a practical research approach for the interviews. The interviews have the aim to gather input for a quantitative analysis and a qualitative analysis. The Q-test will provide the quantitative data and the semi-structured interviews provide the qualitative data about conflict causes, contract strategy and conflict prevention methods. This chapter will thus explain the following objectives:

- Definition of the Q-sample (*paragraph 4.1*)
- P-sample: elaboration on characteristics respondents (*paragraph 4.2*)
- Determine interview structure (*paragraph 4.3*)

### 4.1 Q-sample: defining the statements

The concourse is composed through literature research, whereby twelve articles of different authors are used. Two of those article were literature review articles, which consisted of a review of ten respectively eleven articles. In total the results of 31 different articles are used to define the concourse. The search terms were: conflict, dispute, conflict causes and infrastructure projects. The articles are firstly selected on their title and secondly on their abstract. A list is made of all the causes, which were 103 different formulated causes. As 103 statements are an unworkable list for respondents, the number of statements should be decreased to 20-40 statements (Brown, 1993). The selection process is done based on the criteria, named in paragraph 2.1.2 *Theory on Q-methodology*. The final list should be a complete, comprehensive and clear formation without extreme statements. A complete and comprehensive list is constructed by dividing the statement in themes. Themes are subcategories within the basic categories named in 3.1.2 Conflict causes in infrastructure projects; project related causes, process related causes and contract related causes. The hard factors of projects management as costs/budget, time, quality, risks and information are

project related causes. The process related causes are the factors around these hard factors as human behaviour, market structure and management. Contract related causes entail beside the contract all other official documents and juridical procedures during a project.

**Table 5: Categories conflict causes**

Project related causes	Process related causes	Contract related causes
Information	Human behaviour	Contract
Change/uncertainty	Market structure	Official documents
Costs/budget	Management	Juridical procedures
Time		
Quality		

The first selection is made through excluding overlapping statements within those themes. For example the causes 'time related' and 'delay' and 'acceleration', where 'time related' is excluded of the list. Time related is a general term, where multiple interpretations of respondents can lead to inefficient statements (Kampen & Tamas, 2013). The final statements should only have one meaning to the respondents. This resulted in a list of 75 conflict causes. This amount of statements is still unworkable and should be diminished to around 30 statements (McKeown & Thomas, 2013). A diverse representation per category is achieved to select the statements per category. Each sub-theme has 4 to 12 different causes, see Appendix A. Per category a maximum of 4 statements is chosen based on the times cited in the articles and the diversity. The decision process is also described in this appendix. This process led to a list of 29 statements, see Table 6.

As the composition is based on the quality of the analyst (Brown, 1993), extra validation sessions on the completeness of the list and the internal validity are held. The aim of these sessions was to verify if the chosen statements represent the concourse well or other statements should have been added, which were incorporated in the literature research. The persons had comparable qualities as the further respondents. They all had the opportunity to suggest additional causes. The randomly numbered statements are presented in Table 6. There are in total 16 project related causes, 8 process related causes and 8 contract related causes.

**Table 6: First list of conflict causes**

Nr.	Statements	Category
1	Unrealistic expectations (customer)	Process
2	Acceleration activities	Project
3	Termination contract	Contract
4	Final certificate and payment	Project
5	Availability of information	Project
6	Delayed by other contractors employed by the client (e.g. utility companies)	Project
7	Postpone part of the project	Project
8	Opportunistic behavior	Process
9	Ambiguous roles and interface problem	Project
10	Quality of design	Project
11	Lack of communication	Process
12	Quality of technical specification	Contract
13	Outstanding payment	Contract
14	Liquidated damages	Contract
15	Percentage change original design	Project
16	Supervision and coordination contractor	Project
17	Failure to plan and execute the changes of works	Project
18	Adversarial approach in handling disputes	Contract
19	Contradictory and error of information in mass of documents	Contract
20	Measurement and valuation contracted work	Project
21	Changing requirements	Project
22	Unforeseen contingencies (late changes, design variations, (site) conditions, weather etc.)	Project
23	Responsibility risks	Project
24	Contractual details	Contract
25	Interpretation and ambiguities in contract terms	Contract
26	Individual's influence (level of power, ambition, dissatisfaction and desire for growth)	Process
27	Problems with local stakeholders	Project
28	Impact changes	Project
29	Lack of team spirit or distrust	Process
30	Communication patterns	Process
31	Political influences	Process
32	Insufficient knowledge of each other's interest	Process

## 4.2 P-sample

The p-sample is the result of the sampling process by the respondents. The selection of respondents has thus a major influence on the possible outcome of the results. The aim of the q-sort is to identify the possible root causes of conflicts and collect the perspectives of the main actors in conflicts between client and contractors. Therefore the following preconditions are established to select the possible respondents:

- The respondent works for a client, contractor or engineering company
- The number of respondents should be equally distributed on the above roles
- The number of respondents working for one particular contractor or client should be minimized
- The respondent has at least 10 year experience in the infrastructure sector and has been involved in multiple projects
- The respondents should be a project manager, project leader, contract manager, tender manager or director of one of those professions.

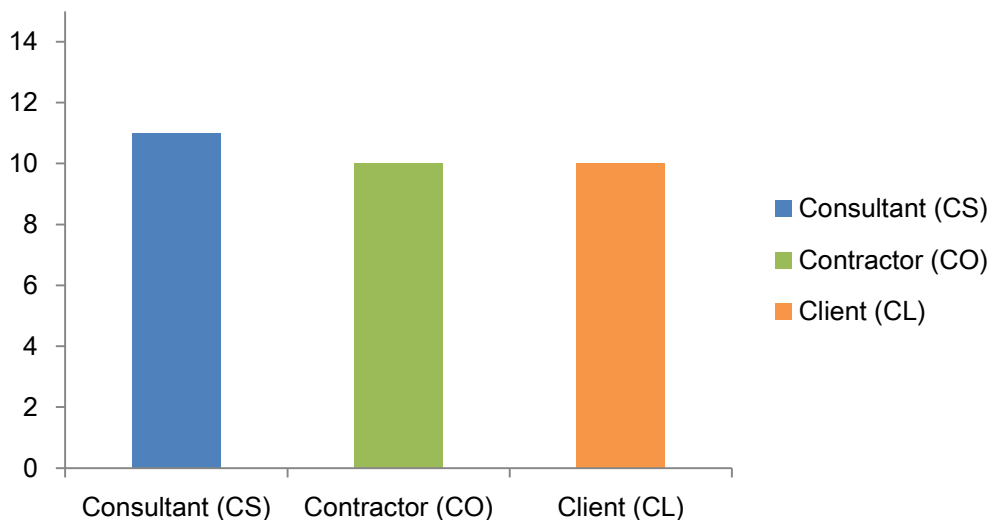


Figure 15: composition P-set

### 4.2.1 Composition P-set

The 31 respondents are interviewed and have conducted the Q-test. The respondents equally represent the roles of the client, contractor and consultant, see Figure 15. The respondents employed by an Engineering company are all Royal HaskoningDHV employers for practical reasons. The working experience of the consultants is figured in Figure 17. The

majority of the consultants are involved within project on behalf of the clients. They perform contractual work, are involved during the preparation, have project management tasks or technical responsibilities. Two respondents work mainly for contractors, during tenders or during the contractual phase. They perform mostly design and technical support and project management experience. The other two respondents work alternately for clients and contractors. The interviews were in the Provinces Noord-Holland, Zuid-Holland and Utrecht, but their geographical distribution is of less value as they have experience in project also in other parts of the country.

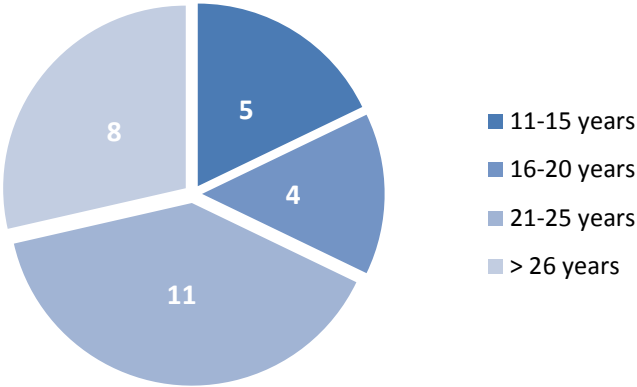


Figure 16: Working experience (years) respondents

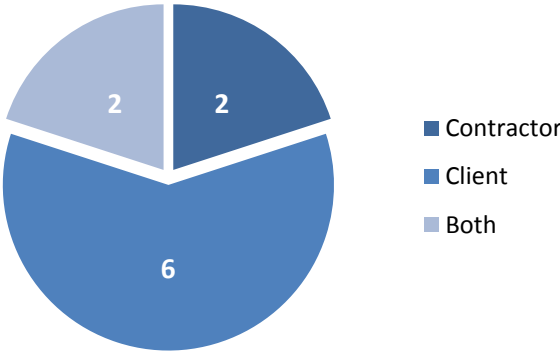


Figure 17: Main working experience consultants

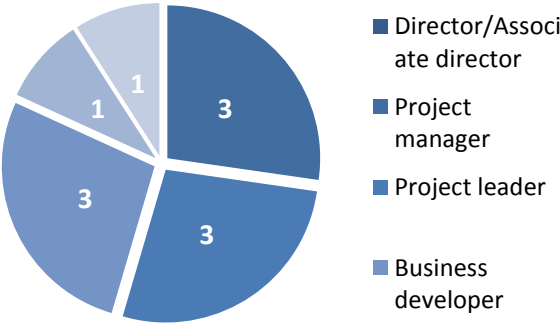


Figure 18: Functions consultants

The respondents representing the client and contractor are from different types of organizations. The clients represent in total seven different client organisations; three different municipalities, one province, Rijkswaterstaat, one district Waterboard and one Seaport. The respondents representing the client are located in the several provinces within the Netherlands; Utrecht, Noord-Holland, Zeeland and Gelderland. The representation is diverse with local, decentral and one national acting client. However, the three respondents

representing a decentral acting client origin from only one organisation. The contractors are divided in regional, national and one engineering consultancy. They represent in total seven different contractor organisations; five different national contractors, one regional contractor and one engineering consultancy. The engineering consultancy acts as a contractor within projects in the Netherlands. The majority represents national contractors, which implies they reflect on projects situated in several regions. One more regional acting contractor has most experience situated in one region. The distribution of the national contractors within the Netherlands is less relevant, because they have projects within all Provinces of the Netherlands. The interviews have taken place in Noord-Holland, Utrecht, Brabant and Zuid-Holland. The locations of the interviews is figured in Figure 23.

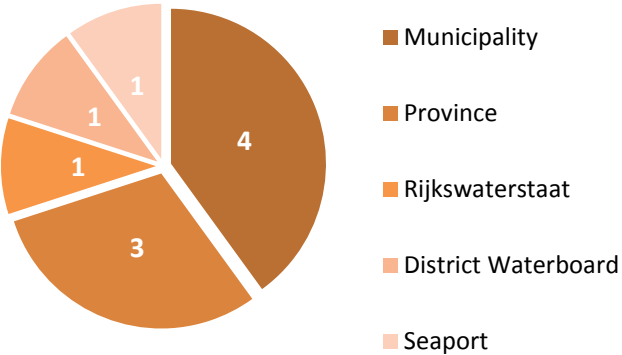


Figure 19: Organisations clients

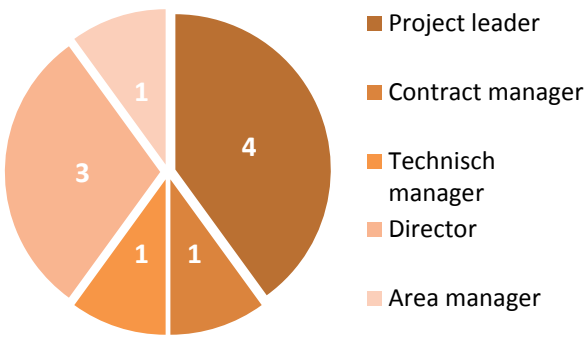


Figure 20: Functions clients

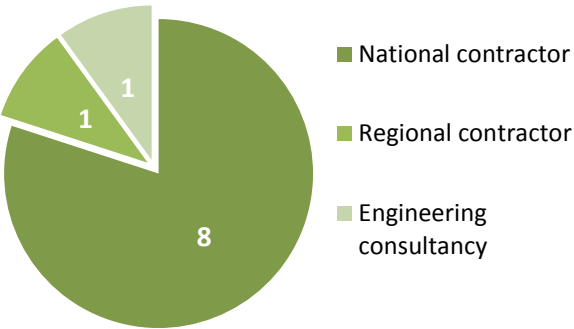


Figure 21: Organisations contractors

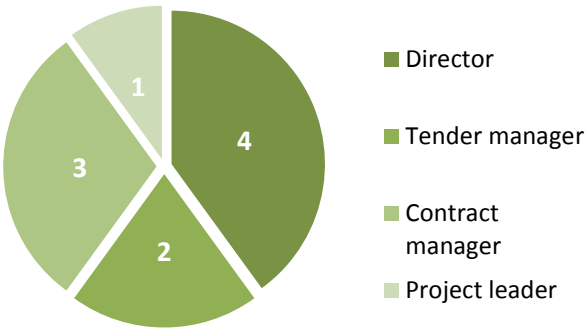


Figure 22: Functions contractors

Subsequently the working experience of the respondents is pictured in a Venn-diagram, which shows the previous working experience of the respondents within other fields. The perspectives of the respondents may be influenced by their previous roles in projects, but this diagram does not picture the ratio between the different roles and the sequence of the different roles. Three respondents are employed by a contractor and an engineering company, four respondents are in their career employed by a client and an engineering



company and four respondents are employed by a client and contractor. Two people are employed by a client, contractor and an engineering company, while 18 respondents have only experience in their current role. The majority of the respondents have more than 20 years' experience in the infrastructure sector.

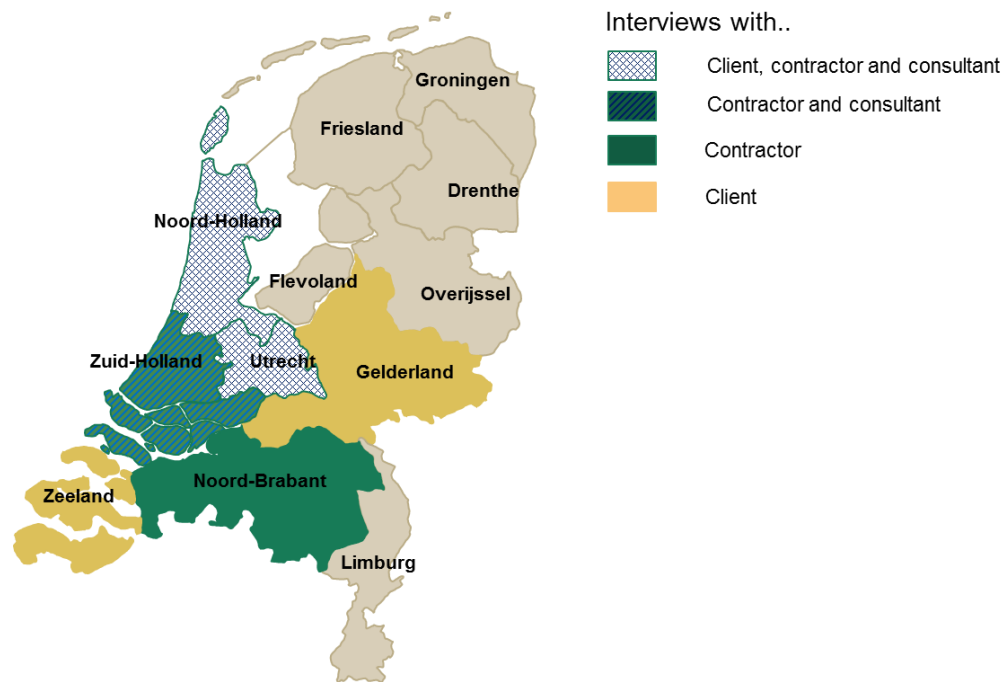


Figure 23: Location interviews

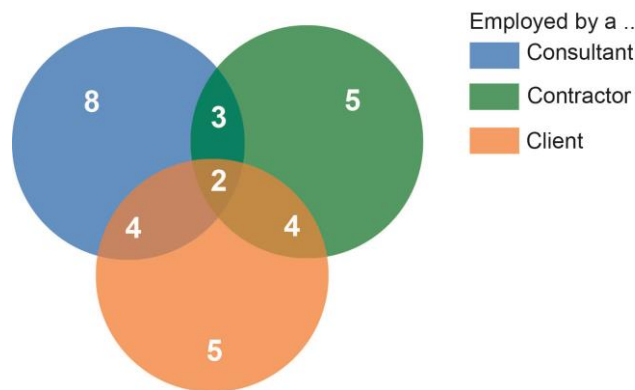


Figure 24: Working experience within other project roles

The respondents based their given answers on their experience within projects. The distribution of the several contract types and budgets are therefore relevant to mention. The majority has most experience with UAV-GC contracts or a combination of several contracts. A minority has only expertise in RAW contracts. The characteristics regarding the budgets and contract types of those projects are presented in Figure 25 and Figure 26. The difference in this dispersion per role is minimal, while the respondents representing governments respectively refer to more RAW projects.

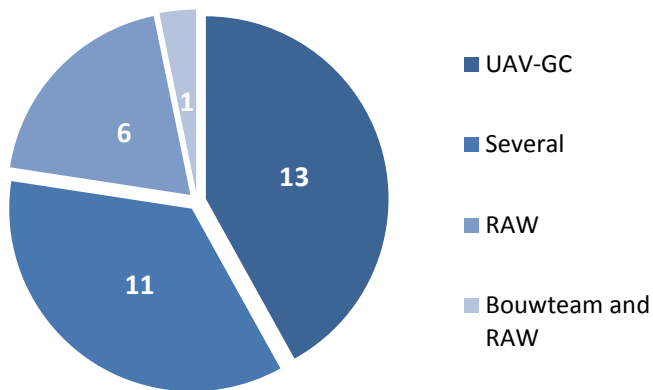


Figure 25: Contract types referred projects

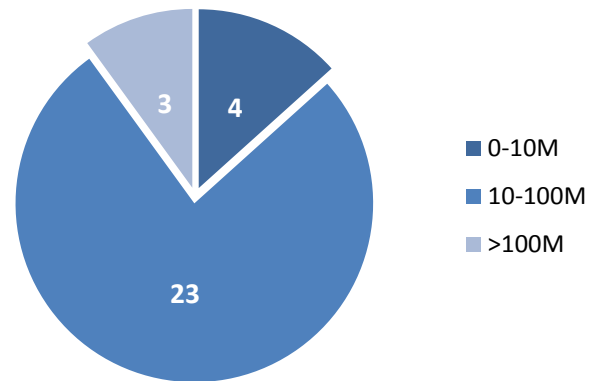


Figure 26: Budget referred projects

## 4.3 The execution of the Q-sort

As stated in Chapter Methodology it is extremely important to instruct the respondents before and during the Q-sort to eliminate misinterpretations or ambiguities.

### 4.3.1 Instructions during Q-sort

First the respondent is given definitions about key objectives of this research. Subsequently the scope is explained by stating the conflicts arise during the contractual phase between public clients and private contractors. Private contractors are the responsible organisation during the realisation phase of the project. Conflicts between public clients and their hired consultant are excluded in this research. Also conflicts between contractors and sub-contractors are excluded. After clarifying the scope of the Q-sort, the main question of the Q-sort is further explained. The main question of the Q-sort is:

*If a conflict occurs between client and contractor during the contractual phase of a project, this is mostly caused by ...*

Besides underlining a second time the scope by stating the conflicts should arise during the contractual phase and between client and contractor, the importance of the word mostly is underlined by the researcher. As all statement could be possible conflict causes, the respondent is asked to make a selection of the possible statements. Thus the respondent is not asked to refer to the legitimacy of the statements, but more on their actual occurrence. This should prevent respondents to reason based on assumptions of possible combinations. First, the respondents had to divide the statements in three categories; agree, disagree and neutral. This indicates the neutral statement distribution, without forcing the respondents to

place the statements in the predefined pattern. When respondents agree with a statement, they define that statement as mostly a cause of conflict between client and contractor during the contractual phase. Disagree could mean the respondent never experienced the statements as causes of conflict or they experienced it hardly ever as cause of a conflict. Neutral are statements, which could be a cause of conflict, but is not a dominant or frequent cause. Neutral statements could also be statements, where respondents do not have an outspoken opinion about or which are utterly neglected as potential cause.

Subsequently the respondents were encouraged to place all the statements in the predefined pattern. Otherwise the analysis of the results of the Q-sort could not be conducted due to incompleteness.

#### **4.3.2 Additional interview beside the Q-sort**

The interview corresponding to the Q-sort enhances three themes. First questions about some basic background information regarding their background, current working activities, project experience and their previous working experience is asked. Subsequently the Q-sort is introduced and conducted. Corresponding to the Q-sort, the respondents are asked to their motivation about their most extreme scored statements. Thus the six statements they scored with -5, -4, +4, +5. The respondents have the strongest opinion on these statements and thus the reasoning behind these choices could the researcher give more insight behind the causes. Why are those causes of conflicts according to the respondents? And why are the statements with the lowest scores not of hardly ever a cause of conflict?

Respondents involved during the pre-contractual phase are also asked about current practises on conflict prevention during the determination of the contract strategy. The respondents employed by the client were all except one able to answer this question. Eight consultants have most work experience with clients, whom three were able to give a grounded answer to above question.

All respondents were asked on their experience during the procurement phase of several projects. Which strategies were according to them beneficial to conflict prevention and which activities during the procurement phase are detrimental to conflict prevention. And why are those activities beneficial or detrimental to conflict prevention?

Lastly to closure the interview, the respondents were asked to their wish. What would they wish to change immediately in order to prevent conflicts in future projects. This closure

question gives the respondents the potential to speak out their most desired prevention method without practical limitations. The motivation behind this desired change is most important to identify which aspects of prevention methods they experience effective.

**Table 7: Structure interviews**

Subject per respondent	Explanation extreme statements Q-sort	Conflict prevention contract strategy	Conflict prevention procurement phase
<b>Client</b>	X	X	X
<b>Contractor</b>	X		X
<b>Consultant</b> with experience during the determination contract strategy	X	X	X
<b>Consultant</b> without experience during the determination of the contract strategy.	X		X

## 4.4 Conclusion

The Q-sample consists of 32 statements derived from literature based on predefined criteria from scholars on Q-methodology (completeness, comprehensiveness and clear formation without extreme statements). These statements are tested on interpretation before they were used during the interviews. The P-sample is established by interviewing 31 respondents. The respondents are equally distributed on the three main project roles; client, contractor and consultant. One respondent is excluded from further analysis as the respondent did not meet the preconditions.

The corresponding interview themes to the Q-sort were dependent on the responsibilities of the respondents. Clients and consultants with responsibilities or experience during the pre-contractual phase were asked to their experience with involvement of conflict prevention during the determination of the contract strategy, conflict prevention during the procurement phase and explanation of their identified conflict causes. Contractors and consultants without responsibilities or experience during the pre-contractual phase were only asked about conflict prevention during procurement phase and their explanation of the identified most and least common conflict causes.

# 5.

## Results data analysis

The results of the interviews are separated in two parts; results concerning conflict causes and results concerning conflict prevention. The first part of the results consists of the factor analysis of the Q-methodology. The result of the factor analysis is first reported per factor. Thereafter the observation and subsequently the interpretation of these results are described. The observation is analysed through a network analysis performed with the software program Atlas.ti. The interpretation of results reflects on the outcome of this network analysis and lead to a model representing the six major root causes of conflicts in infrastructure projects. The second part of the results consists of an analysis of the conflict prevention methods named by the respondents and found in literature. The chapter is concluded by combining the results on conflict causes and conflict prevention methods.

### 5.1 Part A: Q-Methodology on conflict causes

#### 5.1.1 Factor analysis

The factor analysis is done by a Principal Components factor analysis, which calculates the correlations and performs a raw factor analysis (Krueger et al., 2001). The further rotation is based on the criteria named in 2.1.2 Theory on Q-methodology. Multiple iterations are executed to optimize the factors. The contributors per factor should have a minimum loading of 0,46 for a  $P < 0,01$ . This resulted in seven non-loaders (CS\_03, CL\_02, CS\_01, CO\_08, CS\_02, CO\_09, CS\_09 and CO\_10) and two hybrid loaders (CO\_05, CL\_03). Hybrid loaders are contributors on multiple factors. They are addressed at the factor with the highest value. A high number of non-contributors is not preferred. Thus the  $P < 0,05$  loading with a contribution  $> 0,35$  are also included as contributors. Respondents, which are already assigned to a factor, are not called hybrid if they have a  $p < 0,05$  loading on another factor. This resulted in only two non-contributors (CS\_03 and CS\_09). The non-contributors represent both the consultants' perspective, which is not desired. However the factor loadings were much higher compared to a rotation with non-contributors of different organisations. The factor loadings per respondent are figured in Table 8. The distribution of the respondents on the factors is pictured in Figure 27. There are 12 contributors to the first

factor, which consists of four consultants, three clients and five contractors. The second factor has 7 contributions, consisting of only one consultant, three clients and three contractors. The last factor consists of three consultants, four clients and two contractors. The first factor not only includes the most respondents, it also represents half of the interviewed contractors as well as most consultants. Four out of ten clients is represented by the third factor. The consultants are underrepresented in the second factor, while the client and contractor are equally represented. Thus in general the different views are equally distributed over the three factors with a slight underrepresentation of the consultants in the second factor and the contractors in the last factor.

**Table 8: Factor loadings respondents (Loadings with a \* are  $p < 0,01$  loadings)**

Respondent	Factor A	Factor B	Factor C
CS_02	0,2620	0,1726	0,3674
CS_03	0,2278	0,3387	0,0832
CS_04	0,5525*	0,3108	0,0538
CS_05	0,5603*	0,2526	-0,3166
CS_06	0,1032	0,2618	0,5647*
CS_07	0,2037	0,3612	0,5401*
CS_08	0,5865*	0,3715	0,0506
CS_09	0,3384	0,1067	0,3204
CS_10	-0,0396	0,8897*	0,0908
CS_11	0,7232*	-0,2614	0,2871
CL_01	0,6277*	-0,0055	0,2957
CL_02	0,1827	-0,2624	0,4531
CL_03	0,0646	0,6281*	0,4761*
CL_04	0,5574*	0,1193	0,2211
CL_05	0,2183	0,6784*	0,3615
CL_06	-0,1114	0,1817	0,5915*
CL_07	0,8012*	-0,0455	-0,1137
CL_08	-0,1087	-0,0748	0,5064*
CL_09	0,0678	-0,3924	0,6579*
CL_10	0,3492	0,5802*	0,2443
CO_01	0,8548*	0,1034	-0,0269
CO_02	0,4724*	0,2627	0,2144
CO_03	0,7344*	-0,1454	0,0368
CO_04	-0,0172	0,7034*	-0,1825

CO_05	0,4707*	0,5721*	0,1780
CO_06	0,6395*	0,1564	0,1552
CO_07	0,5076*	0,1684	0,4477
CO_08	0,2191	0,1888	0,3591
CO_09	0,2245	0,4111	-0,0816
CO_10	0,3464	-0,0636	0,4107
Total contributors	<b>12</b>	<b>7</b>	<b>9</b>

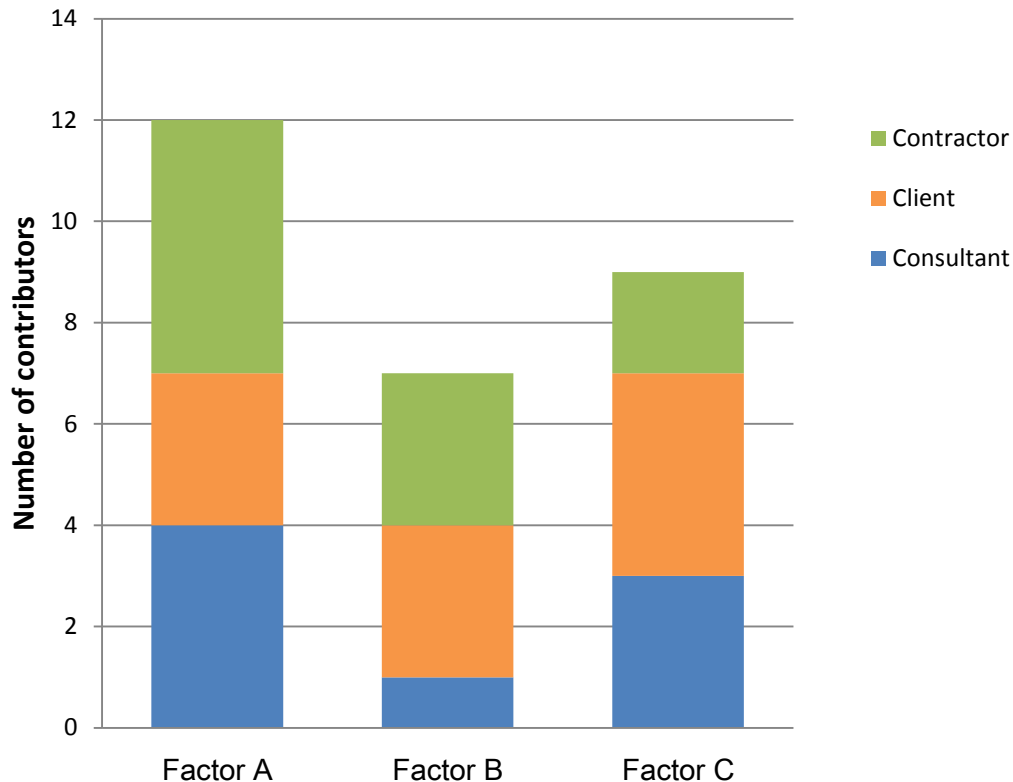


Figure 27: Distribution respondents on Factors

### 5.1.2 Factor A: Unpredictability and uncertainty perspective

The respondents of Factor A define distrust in combination with project dynamics as the main causes for conflicts during the contractual phase of projects. The combination of unforeseen contingencies or changing requirements together with ambiguities and a difference in interpretation of the contract terms result in a situation extremely vulnerable for conflicts. The availability of information is not regarded as limited, but the interpretation and the selection of the most important information causes the first frustrations among the contractors. The contributors also define the contracting organisations as professional, where the influence of one individual could not lead to conflicts. Termination of the contract is a too expensive solution or has a too high consequence in their view.

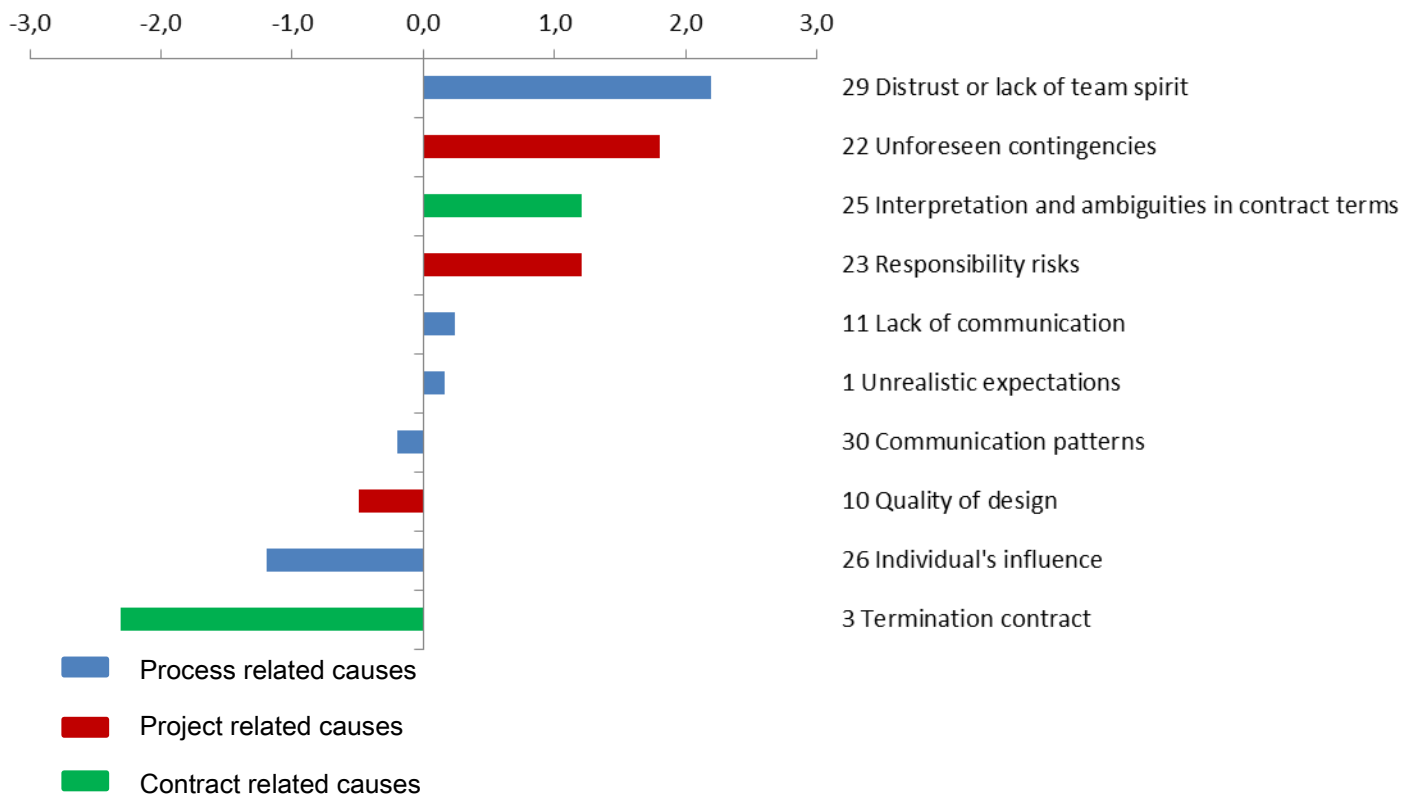


Figure 28: Overview scores 'Unpredictability and uncertainty' (shortened version)

### Characteristic information on the respondents of Factor A

Factor A has 12 contributors with a  $P < 0,01$  loading. Almost all factor loaders have more than 20 years working experience in the infrastructure sector, only 1/12 has 16-20 years' experience. The next paragraph will describe the perceptions and scores related to this perspective. An elaborated representation of the data derived from this perspective is pictured in Appendix D.

Distrust and lack of team spirit is valued as the leading cause of conflicts during the execution of projects with a Z-value of 2.20. The next four causes have one topic in common: *change*. Unforeseen contingencies (1.81), changing requirements (1.22), Interpretation and ambiguities in contract terms (1.21) and responsibility risks (1.20) are all distinctive for this perspective and have a Z-value between 1.22 and 1.20, meaning these causes occur more often as conflict causes according to the contributors. The combination of *distrust and an unpredictable event* is even more vulnerable when the contractor has an opportunistic bid price (1.04) or the availability of information is not supportive (0.92). Who is responsible for the unforeseen contingencies or the diverse interpretation?



The contributors of this perspective value insufficient knowledge about each other's interests (0.22) and lack of communication (0.24) low compared to the other factors. Also unrealistic expectations (0.16) and communication patterns (-0.20), which latter has even a negative Z-value are scored low compared to the other perspectives. Also causes related to the design stage as the quality of design (-0.49) and the percentage change original design (-0.81) are not identified as common cause of conflicts. Quality of design has a low score compared to the other factors.

The more outspoken negative factors are individuals influence (-1.19) and outstanding payment (-1.38), whereby individuals influence is distinctive and outstanding payment not. The bottom two and thus the least common causes of conflicts according to the contributors of factor A are adversarial approach in handling disputes (-1.61) and termination of the contract (-2.31). The contributors describe both organisations as professional, where individuals are not determined and outstanding payments are attributed to administrative mistakes. Handling disputes are standard procedures in the contract and termination of the contract is also seen as not professional and harms the image of both organisations.

This is a summation of the outcome of the factor analysis resulted in the 'unpredictable and uncertainty' perspective. The next paragraph will analyse the comments of the contributors and the interrelations they made between the several causes.

### **Observation**

The combination distrust and lack of team spirit, and unforeseen contingencies have the most extreme positive scores compared to the other Z-values. The project and process related causes are equally distributed along the negative and positive axis. However the contract related causes are mostly negatively valued, whereby the three causes with the lowest score are all contract related. The high scoring causes all have a relation with risks and uncertainties. The contributors of this perspective identify a combination of risks and uncertainty in combination with distrust as main cause of conflicts during projects while juridical related causes are identified as the least important causes.

The network analysis resulted in a network view of the interrelations of the different causes and the perspective of the respondents on the origin of those causes. Most relations are made with the cause 'distrust and lack of team spirit'. Conflict causes related to risks and uncertainties are not excessive interrelated with 'distrust and lack of team spirit'. Contract

ambiguities are related by two contributors to the conflict cause 'distrust and lack of team spirit'. It evokes a discussion between the project managers on their perspective of fairness and equity and their interpretation of the contract. The amount of changes is also by two contributors related to the conflict cause 'Distrust and team spirit'. One contributor related unforeseen contingencies as an opportunity for strategic behaviour, leading to distrust.

Knowledge about the interests of the other party and respecting those interests influence the level of distrust according to two contributors. Understanding the responsibilities of the other party and the accountability within their own organisation expands the level of trust between the organisations. Stuck communication is named by three contributors as an underlying cause of conflicts, but does not show direct relations with the other main conflict causes. However, transparent and open communication is named as a negative contributor to the level of distrust by one contributor. Opportunistic behaviour of the contractor and strategic behaviour of the client or contractor also have a negative influence on the level of trust between the organisations according to two contributors. One contributor explains that limited flexibility of the client regarding budget or deals with local stakeholders can result in a limited solution space for emerging conflicts.

A difference in expectations between the client and contractor could have multiple origins. 'Expectations of the involved parties' is named in relation with the conflict causes; 'incomplete preparation', 'knowledge about each other's interests' and 'distrust and team spirit'. The client will unintentionally compose a picture about the proposed outcome of the project. The way this picture is communicated and how these expectations of the client are transferred to the contractor explain a possible dissimilarity. For example, when a client suggests an adjustment and does not define it as additional, but as part of the project with the aim to fulfil the original picture. This could be perceived by the contractor as an unrealistic expectation when they define it as additional work, which may lead to frustration. An incomplete preparation or ambiguities in contractual documents increase the probability of diverged expectations. During the contractual phase of the project, discussions evolve about the content of the project. Where the interpretations of the official documents do not clarify the right approach, the willingness of both parties is leading. The flexibility of both organisations will influence the potential to solve this disagreement.

A difference in expectations could also be supported when the expectations are not discussed and the parties make assumptions about the plausible expectations instead of discussing them. These plausible expectations are based on the assumptions regarding the

interest of the other organisation. This links the difference of expectations with the insufficient knowledge about the interests of each other, because assumptions have been made instead of discussing these assumptions. Client and contractor lie further apart through such a misunderstanding, which may result in an increase of the level of distrust.

This dissimilarity in expectations could be supported by the so-called Bahama model. The Bahama model refers to the behaviour and expectations of a client during a project with an integrated contract. This model implies the client has a passive attitude as most of the responsibilities are transferred to the contractor. While the client expects the contractor pursues in a competent matter and doesn't need any form of support, the contractor actually expects to receive some communication or support on his progress, design considerations, stakeholder management or permit procedures.

The most important interrelations made by the twelve contributors of this 'distrust and uncertainty perspective' are:

- Discussion on contract ambiguities and the amount of changes stresses the level of distrust
- 'Distrust and lack of team spirit' has the most diverse interrelations with multiple conflict causes
- Diverse expectations of client and contractor are named as interrelation with conflict causes: stakeholders, knowledge of each other's interests and distrust.

### **5.1.3 Factor B: Human and behaviour perspective**

The respondents of Factor B define the human factors as the strongest contributing factor to conflicts. Distrust in combination with insufficient knowledge of each other's interests results in a situation where both parties do not understand and respect each other. Unrealistic expectations of the client in combination with opportunistic behaviour of the contractor are a hazardous combination when experienced together. This will also result in a conflicting situation. They state that changes during the project, contradictories in documents or errors and ambiguities in the contract are negotiable, when the human factors have a sufficient level.

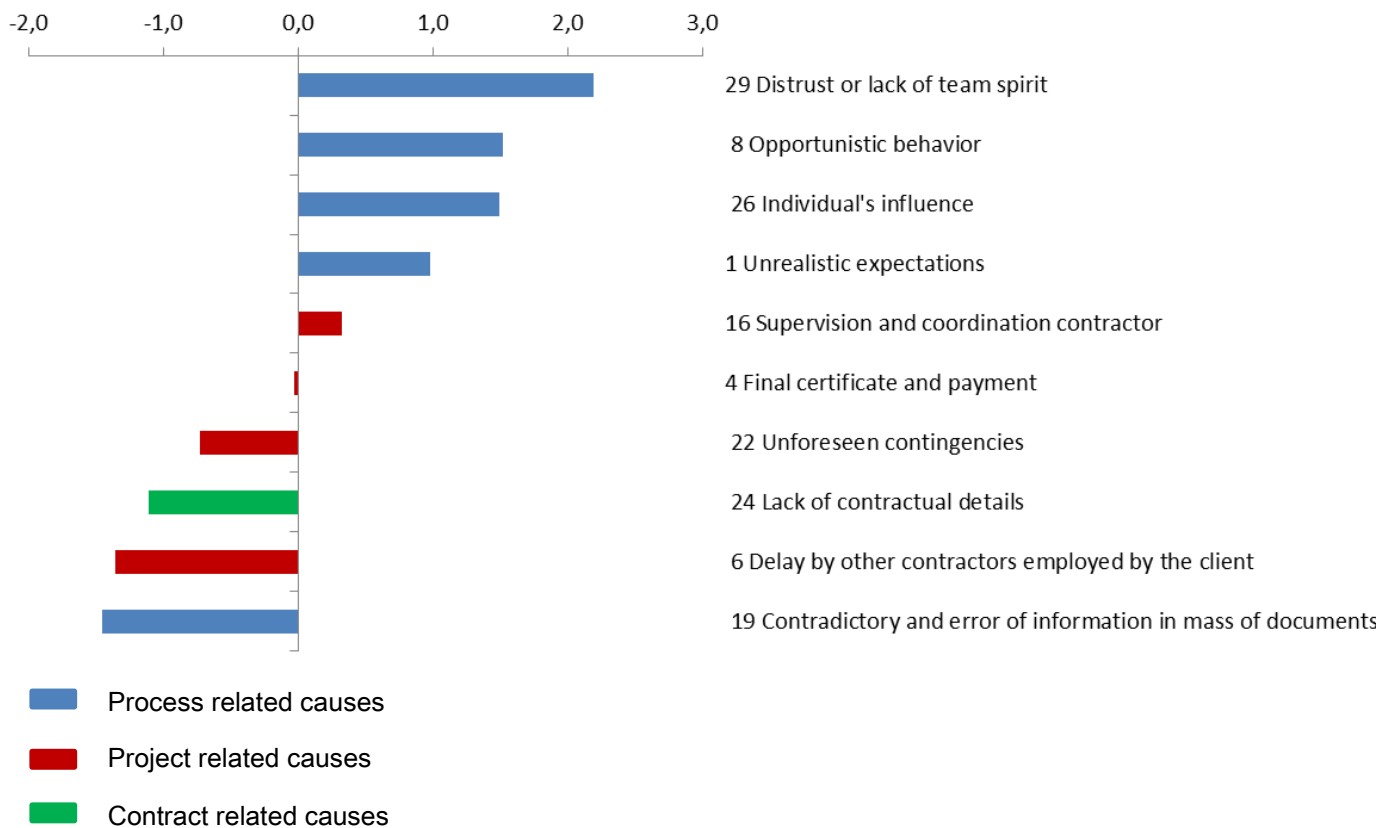


Figure 29: Overview scores 'Human and behaviour' (shortened version)

### Characteristic information on the respondents of Factor B

This factor has 7 contributors, which are mostly involved in UAV-GC projects and the higher budgets. Every respondent is responsible for projects above 1 Million and 62,5% for projects above the 10 Million. Above that all contributors have leadership positions within their current organisation. The next paragraph will describe the perceptions and scores of these contributors. An elaborated representation of this perspective is pictured in Appendix D.

Distrust or lack of team spirit (2.19) and insufficient knowledge of each other's interests (1.82) are identified as the two most occurring causes of conflict by the contributors of this factor. The highest valued causes are related to human behaviour. Opportunistic behaviour (1.53) and individuals' influence (1.50) are both valued relatively high compared to the other factors. Communication patterns (1.44) and unrealistic expectations (0.98) are also related to the human aspects of projects instead of the more project content itself.

Between neutral and high valued causes are two causes related to the roles and the responsibilities of the organisations. Ambiguous roles and interface problem (0.66) and supervision and coordination (0.33) are both relatively high valued by the contributors of this factor. The vagueness about the responsibilities could be related to the lack of

communication or the insufficient knowledge of each other's interests, but is not further explained by the respondents.

Unforeseen contingencies (-0.73) and changing requirements (-0.97) have a relative low score compared to the other factors. Human behaviour determines the way those uncertainties are handled, but the changes itself are not high valued conflict causes according to these respondents.

The last four causes are distinctive causes of conflicts and according to the contributors of factor B the least frequently occurring causes of conflicts. These causes are contract and project related; adversarial approach in handling disputes (-1.08), lack of contractual details (-1.10), availability of information (-1.23) and delay by other contractors employed by the client (-1.36). The next paragraph will analyse the comments of the contributors and the interrelations they made between the several causes.

### **Observation**

Factor B shows a clear distinction between process related causes and project related causes on the positive Z-axis. The negative Z-values are a combination of project and contract related causes. The seven highest causes are process related causes, which is notable outcome for this perspective. It has extreme high Z-values for 'distrust or lack of team spirit' and 'insufficient knowledge of each other's interest'. The network analysis shows the interrelations between the several causes and explanations given by the seven contributors of the perspective: Human and behaviour.

The conflict cause 'Distrust and lack of team spirit' is related by three contributors to a conflict based on diverse or opposed expectations. Transparency and open communication is named as linking pin by two contributors between 'expectations' and 'distrust and lack of team spirit'. Withholding information is exactly the opposite and counteracts a transparent and open attitude is stated by one contributor. A transparent and open attitude positively influences the opportunity of parties to exchange expectations. Pronouncing expectations decreases the level of distrust between client and contractor. Individuals influence is also named by one contributor explanation for a certain level of distrust or lack of team spirit. Also organisational influences influence the level of distrust mostly through the perception of opportunistic behaviour.

Knowledge of each other's interests is named by each contributor as an interrelation with several conflict causes. Insufficient comprehension or knowledge about each other's expectations could be caused by an insufficient preparation according to two contributors. Insufficient preparation is divided by two different contributors in professionalism of the client, knowledge about the proposed contract and the inability to transform their wishes into requirements within a contract. An understanding about the responsibilities of both organisations increases the knowledge about their interest and supports according to one contributor the level of equality between both organisations. Three contributors relate knowledge of interests directly with the level of distrust. What is the reason of this insufficient knowledge about each other's interests between client and contractor? Two contributors have elaborated on this. They state insufficient training on collaboration, past experiences and organisational influences impedes this sufficient knowledge through inadequate listening capabilities or not enough information sharing.

Stuck communication is addressed by two contributors. One explains the emotional reactions of individuals causes stuck communication, which led to conflicts. The other contributor relates stuck communication to a conflict based on quality of design, which explains a lower level of trust. An atmosphere of distrust results in more reticence of approvals of designs or other plans, which could evoke in a negative spiral of even more distrust. One contributor explains this distrust in combination with a conflict on design quality could be stimulated, when a subjective valuation by an external party is the reason the design is refused.

The most important interrelations made by the seven contributors of this 'human focused perspective' are:

- Each contributor acknowledges that knowledge of each other's interest is an important conflict cause, which relates to several other conflict causes.
- The communication of the clients' interests could be hampered through the inability to transform their wishes into contract requirements
- Distrust is closely related with diverse expectations, supported by the level of open and transparent communication.
- Stuck communication together with a high level of distrust could explain a conflict based on the design quality

#### **5.1.4 Factor C: Lack of clarity and competence perspective**

The respondents define quality of design as most important cause of conflicts. They experience the measurement and valuation of the contracted work as subjective, which result

in frustration. Latter two combined with insufficient knowledge of each other's interest and insufficient communication has the consequence to surprise the other party. This surprise results in irritation, because the point of no return is passed and forces the parties to escalate the conflict internally. Unforeseen contingencies and acceleration are identified as changing requirements and will be executed through the changing procedure. This is a straightforward procedure and will not result in conflicts.

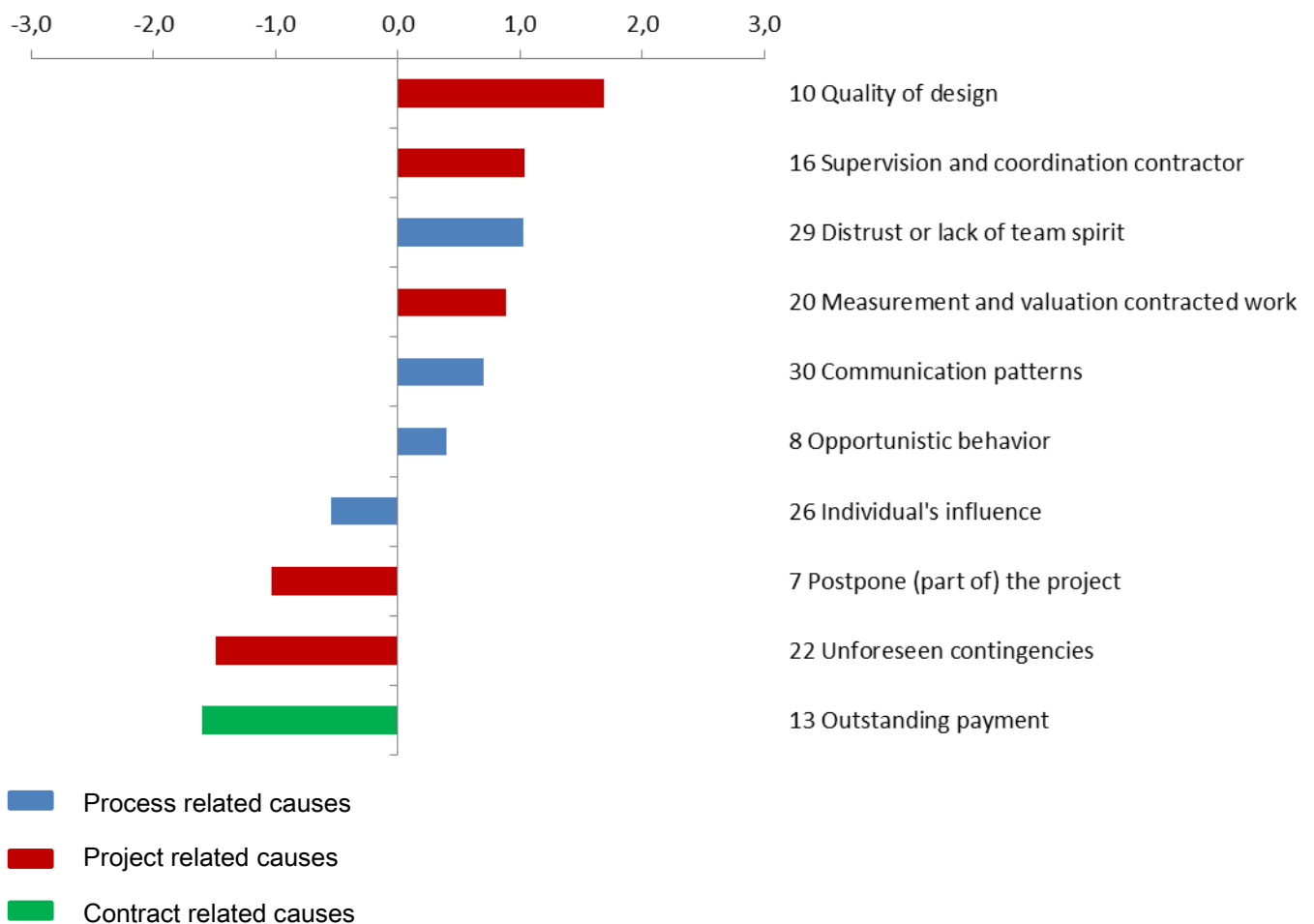


Figure 30: Overview scores 'Lack of clarity and competence' (shortened version)

### Characteristic information on the respondents of Factor C

The nine contributors of Factor C have minor working experience in other positions of the classic triangle (contractor, client and consultant) than their current employer organisation. The contributors are responsible for projects with several contract types, but with a budget about 10 Million (78%). The next paragraph will describe the perceptions and scores of these contributors. An elaborated representation of this perspective is pictured in Appendix D.

The most frequently cause of conflicts according to the contributors of 'the lack of clarity and competence' perspective is the quality of design (1.70), which is a distinctive cause of this factor with a relatively low Z-score. The next three causes, lack of communication (1.38), insufficient knowledge of each other's interests (1.36) and contradictory and error of information in mass of documents (1.08), all supportive to a conflict based on quality of design. Without knowledge of each other's interests and sufficient communication between the organisation together with contradictories and errors of information in the total amount of documents, there will be a completely other perception on the quality of design. Also the possibility of problems with local stakeholders (0.99) has a relation with above named causes. Distrust or lack of team spirit (1.02) is relatively low scored by these respondents as this cause is valued by both other factors as most important cause of conflict.

Delay by other contractors employed by the client (0.60) and liquidated damages (0.57) are both distinctive causes for this factor and slightly positive identified. Availability of information (0.44), opportunistic behaviour (0.40) and adversarial approach in handling disputes (0.25) are three distinctive neutral valued causes of all different types of conflict cause. Thus the availability of information is seen as neutral cause, while the quality of information (contradictories and errors) is valued as one of the leading causes.

The causes related to change have a relatively low score; Interpretation and ambiguities in contract terms (-0.45), changing requirements (-1.13) and unforeseen contingencies (-1.49). Also the quality of the technical specification (-1.31) is valued as not a common cause so conflicts, which is remarkable in contrast with the high valued quality of design cause. The least common cause of conflicts according to the contributors of this factor is outstanding payment (-1.60), but is not a distinctive cause for this factor. The next paragraph will analyse the comments of the contributors and the interrelations they made between the several causes.

### **Observation**

The Z-values of this factor are less outspoken than the Z-values of Factor A and Factor B. The project, process and contract related causes are equally distributed along the Z-value axis. It is also the only factor with a project related conflict cause with the highest score. The eight lowest scores are only project and contract related causes. The network analysis shows that communication is linked by four contributors of this factor as underlying cause for multiple conflict causes.



Four contributors define stuck communication as underlying cause for wrong interpretations of the contract or wrong interpretation of the others interests. When the contractor makes an interpretation of the contract without communicating this interpretation, the chance the expectations of the client are met will decrease. This could lead to dissatisfaction about the end-product or design. The end-product or the design does not fit the original idea of the client, stimulated by the not-communicated expectations. Subjective requirements stimulate the level of interpretation. A requirement as 'a safe bridge' needs an interpretation of the word safe. Restrictions of contract types regarding the communication abilities between client and contractor are by one contributor named as cause for inefficient communication. Subsequently not asking the right questions during communication opportunities causes stuck communication according to another contributor. The same contributor argues this could lead to ambiguities about the distribution of responsibilities.

Distrust and a lack of team spirit, named as the sixth potential cause leading to conflicts, is related to strategic behaviour when information is withheld or opportunistic behaviour is assumed. This led to suspicious behaviour causing distrust, which has an impact on the perceived quality of the design. The quality of design is also influenced by the content of the perceived information. Contradictories in the total amount of information stimulate the level of assumptions or interpretation, which led to a mismatch in wishes or the original idea of the client and the final solution.

Strategic behaviour is named by one contributor as explanation for a conflict based on design quality. This strategic behaviour occurs when the organisations refuse to communicate openly and transparently with each other. Another explains strategic behaviour of the organisations with references to their own organisations. Their personal or political accountability could explain their strategic behaviour and emotional reaction of individuals.

The most important interrelations made by the nine contributors of this 'human focused perspective' are:

- 'Stuck communication' and 'Distrust' are both argued by four different contributors as interrelated root cause for conflicts.
- Stuck communication may result in wrong interpretation of contracts or interests, which results in a conflict on design quality
- Distrust tends to relate to strategic behaviour caused by individuals accountability (personal or/and political) or organisational influences.

### 5.1.5 Consensus statements

Consensus statements are statements, which have a respectively similar score on each factor, which indicates a certain consensus among the respondents on these statements. Four statements do not distinguish between any pair of factors and are thus called 'consensus statements'. Factors with a \* are non-significant at  $P < 0.05$ , the other is non – significant at  $P < 0.01$ .

**Table 9: Consensus statements**

Statement	Factor A		Factor B		Factor C	
	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
15 Percentage change original design	-2	-0.81	0	-0.36	-1	-0.53
17 Failure to plan and execute the changes of works.*	-1	-0.31	0	-0.00	0	-0.16
28 Impact changes.*	2	0.61	2	0.83	1	0.60
31 Political influences.*	-1	-0.39	-1	-0.48	0	-0.30

Especially the values on the political influences are showing a high consensus. The political influences are considered as neutral, which indicates that it could be a cause of conflicts, but depending on other triggers it will evolve to a conflict or not. The impact of changes has a relatively high consensus score, which indicates it is among all respondents identified as frequent occurring cause of conflicts. Failure to plan and execute the changes of works is also a neutral scored conflict causes, which also indicates additional circumstances, determine if this cause lead to conflict or not. Percentage change original design is the only consensus statement with a  $P < 0.01$  score, which indicates a low deviation of the scores among the respondents. The negative score on this cause indicates this is not perceived as common conflict cause during the contractual phase of projects.

### 5.1.6 Interconnection factors conflict root-causes

The network analysis presents the conflict causes and their interrelations, which resulted in a web of multiple lines and interrelations. These interrelations are analysed per factor in previous paragraphs. Each network analysis resulted in a dominant representation of the cause: 'distrust and lack of team spirit'. The factors show on the other causes a more unique perspective. However combining all these interrelations into one network view shows a variety of mutual interrelations and a dynamic causality between several root-causes. The

conflict causes, which have the most interrelations with other causes, are identified as the root-causes of conflicts. An analysing into this network results in 6 dominating causes.

**Table 10: Result network analysis: The root-causes of conflicts**

Name code	Grounded (times cited)	Respondents
<b>Conflict cause – distrust and lack team spirit</b>	28	20
<b>Conflict cause - Communication</b>	20	14
<b>Conflict cause - expectations</b>	19	10
<b>Knowledge each other's interests</b>	16	13
<b>Contract – interpretation</b>	11	10
<i>Conflict cause – opportunistic behaviour</i>	10	8
<i>Conflict cause – individual influences</i>	9	8
<i>Root cause – organisation influences</i>	9	5
<b>Root cause – strategic behaviour (summation)<sup>1</sup></b>	26	14

‘Distrust and lack of team spirit’ was the most named factor as underlying conflict cause or interrelated conflict cause and is named by the majority of the respondents. ‘Communication’ is related with conflicts through 14 different respondents. Misaligned expectations is named more frequently than ‘knowledge of each other’s interest’, but named respectively by less different respondents. The conflict cause ‘contract interpretation’ is cited by the same amount of respondents as ‘expectations’, but not as frequently. Strategic behaviour is a combination of the root cause ‘strategic behaviour’ and ‘organisational influences’ and the conflict cause ‘opportunistic behaviour’.

The combination of those six factors seemed most determined for escalating conflicts. The unpredictability and uncertainty perspective (Factor A) pays more attention to distrust in combination with interpretations of the contract. The contributors of this perspective state subsequently expectations are relative important. While the human and behaviour perspective (Factor B) pays most attention to almost all the six causes except contract

<sup>1</sup> The summation of the rows grounded ‘opportunistic behaviour’, ‘organisational influences’ and ‘individual influences without dual coded objectives.

interpretation. They state knowledge of each other's interest is most contributing to conflicts. Distrust and diverse expectations are interrelated through the existence of open and transparent communication. The lack of clarity and competence perspective (Factor C) has more attention for communication respectively to Factor A and Factor B, but assesses 'distrust' with a respectively low value, see Figure 31. The light blue shading represents the respective weight of this root-cause to the conflict probability.

According to the interviewees and referring to the different perspectives, not every cause of these six root causes are necessary for emerging conflicts, only a combination of a few of these causes are enough. To derive a more specified view on the relations of each of these root-causes a more specific network analysis is conducted on each root cause. The next paragraphs will focus on each cause.

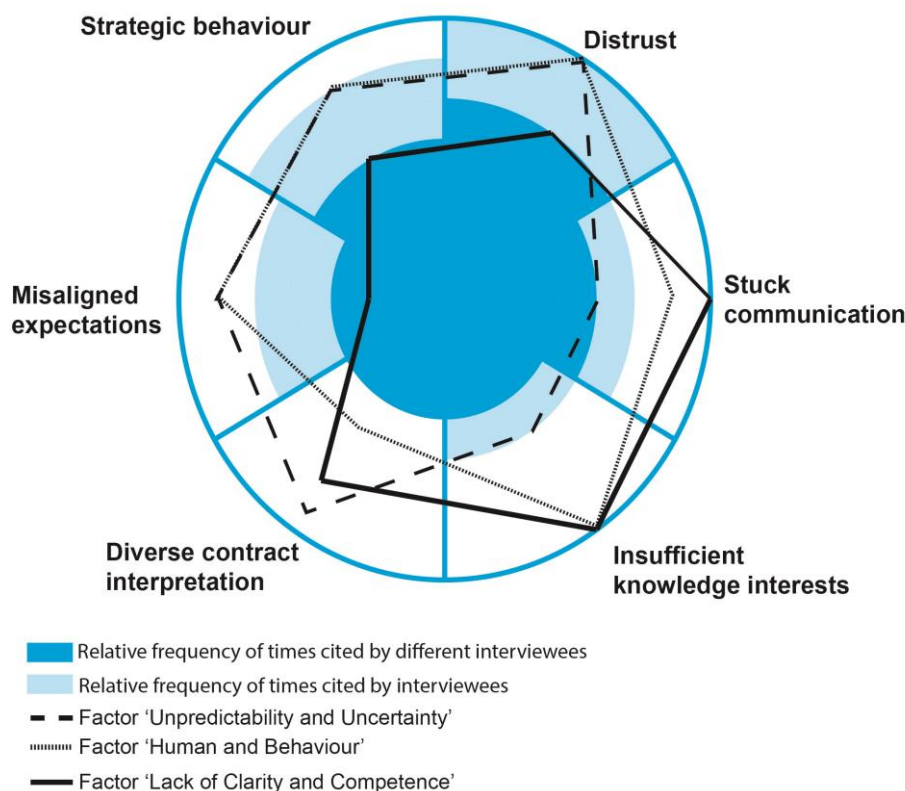


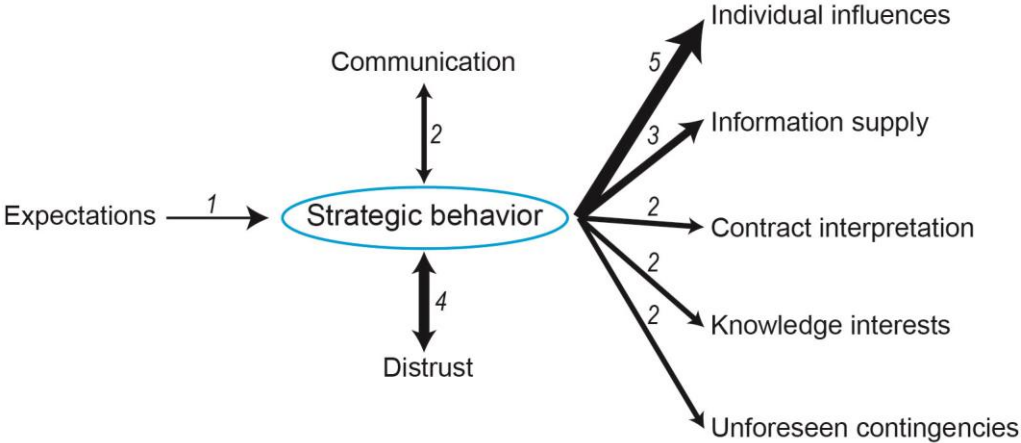
Figure 31: Factors plotted with the identified root causes

### Strategic behaviour

In this research strategic behaviour entails intentional behaviour of individuals or organisations with the purpose to accomplish own interests, while they are aware of possible conflicting interests and interdependency. The network analysis to strategic behaviour resulted in web of several causes influencing or being influenced by strategic behaviour. It reveals to have the most cohesion with distrust and lack of team spirit. Distrust and a lack of

team spirit is named as a consequence of strategic behaviour, while it is also named as a cause for strategic behaviour. CS\_04 states about the relation between opportunistic behaviour and distrust: *"It already starts with distrust as a basis."* This is his reaction on the question why opportunistic behaviour is a cause of conflicts. Also CO\_05 emphasizes the relation between strategic behaviour and distrust by stating that a client reacts on an opportunistic tender including promising EMAT plans with more contractor requirements out of distrust. CO\_07 gives an example where distrust could lead to strategic behaviour. A client reveals to share particular information about the current situation of a project out of distrust. The client has anxiety about potential misuse of this information by the contractors. CL\_04 affirms this relation by stating that occasionally strategic behaviour influences the information supply.

The same reciprocal reasoning holds for the relation with communication. CL\_04 discusses the relation between stuck communication and strategic behaviour. The client interprets every deviation as strategic behaviour of the contractor, because this deviation could potentially change the whole project. As reaction the communication between client and contractor gets stuck. This strengthens the already existing tensions within a project. While the opposite also holds. Stuck communication supports strategic behaviour as both organisations are not informed about the activities of each other.



**Figure 32: Interrelations 'Strategic Behaviour'**

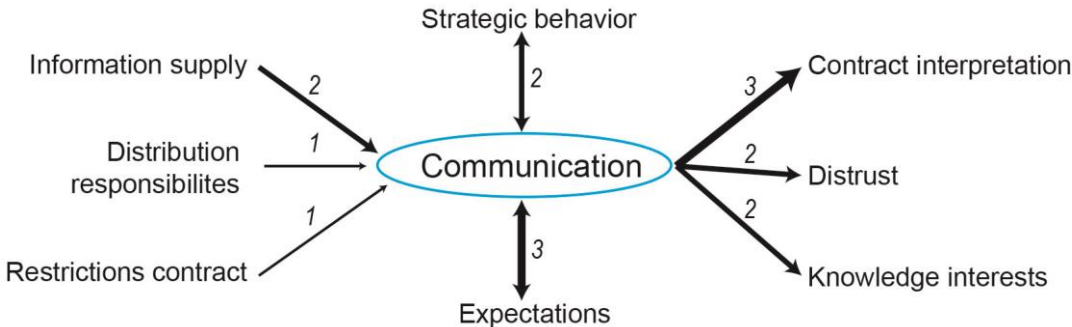
Misaligned expectations are named twice as possible cause for strategic behaviour. CO\_01 names top-boundaries for prices as incentive for opportunistic behaviour, which is caused by unrealistic expectations. The effect on individuals' behaviour is named four times, stating strategic behaviour is an explanation for emotional reactions. Also personal and political accountability could be a reason for strategic behaviour.

Strategic behaviour has also influence on the exchange of information. Strategic behaviour could result in withholding information, named in the above examples. Strategic behaviour supports also contract interpretation or ambiguities according to two respondents. CS\_03 states ambiguities in contracts is mostly discussed and solved with each other, unless a lot of money is involved. An opportunistic tender of the contractor could also result in more tensions about ambiguities in contract terms. The contractor will interpret ambiguities as possibilities to transfer responsibilities to the other party.

Knowledge of each other’s interest and subsequently understand those interests and the corresponding responsibilities could be misused through organisational influences, named by two respondents as consequence.

**Stuck communication**

Stuck communication implies client and contractor refuse to talk with each other, but proceeds to formal communication forms. Stuck communication has a reflective relation with multiple objectives, consequences and multiple potential causes of stuck communication. ‘Emotional reactions’ is two times mentioned as potential cause of stuck communication. The feelings of being ignored or being seized are emotional feelings named by CL\_10 as cause for stuck communications and subsequently for miscomprehension. CO\_01 describes the relation of withholding information and not communicating about problems as: *‘The biggest problem with conflicts is there are problems, which are not being discussed or kept under the radar. Eventually they surprise each other, which results in a kind of trench realisation.’* This is also related with contract interpretation through CL\_06. Different interpretation of the contract gets worse when informal communication decreases. The threshold is too high to discuss early problems.



**Figure 33: Interrelations 'Communication'**

Distrust and communication is one of those objectives and is named several times by respondents as close relation. The relation between trust and communication is described by CO\_10 as: *“Communication is very important. It will determine if there is an atmosphere, where organisations find each other and a level of trust arises.”* Also CS\_09 describes this relation by stating: *‘During my current project we experienced that things weren’t fulfilled as agreed upon, other interpretation of things and the communication went wrong (..) The trust was gone.’*

### Misaligned expectations

Misalignment of expectations arises when the beliefs of clients and contractors deviate extraordinarily or have conflicting actions or states of mind. It has the closest relation with interpretation of the contract. CO\_04 gives an example with a coloured door: ‘You established a contract, where you expected a blue door. The contractor places a red door, which also fits the contract. However, you still want a blue door, while you are not allowed to ask for it as the contract does not eliminate the solution of a red door. This ends in conflicts.’ Through different expectations the contract will be interpreted differently. Distrust and communication have reciprocal interactions with expectations. Stuck communication led to more misaligned expectations, while misaligned expectations also hamper the further communication. This is described by CL\_06 during an explanation of conflict caused by a different opinion on the design quality: *‘We don’t take enough time in the beginning to communicate with each other. We think we agree with each other, until someone goes outside and realised it is not what we intended.’* The mutual relation with distrust is mainly influenced by satisfying the expectations or not. When distrust dominates the relation between client and contractor, this will negatively influence the further expectations of each other.

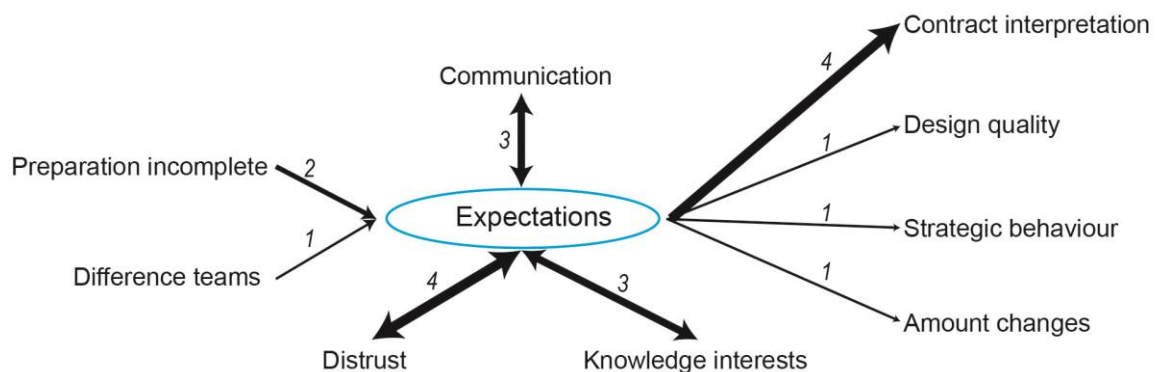


Figure 34: Interrelations 'Expectations'



An incomplete preparation causes more diverse expectations, because more open ends give more opportunities for solutions, while still serving the contract. This has interfaces with the allocation of risks, expectations of stakeholders and knowledge of the contract.

**Insufficient knowledge of each other’s interests**

When the perception of the other’s interests differs fundamentally with their actual interests and results in a conflicting implementation of the other’s proposed way of thinking, the research names this insufficient knowledge of each other’s interests. The relevance of knowing each other’s interests is described by CO\_05: *‘I must be able to explain why we must make a profit and do not want to make a loss, as we are a quoted company. (...). You also must be able to understand the political policies of the client and hierarchical relation within this company. The fact they need legality of the payments, as they consume taxpayers money.’*

Distrust and communication have the strongest relation with knowledge of each other’s interests. CO\_01 describes the relation between trust and interests: *‘Trust is also about the understanding of the existence of the client and the existence of the contractor.’* Communication, interests and conflict is described by CO\_10: *‘It is excessively committing to your own right. When there is a conflict, you do have to understand each other’s interests.’* Insufficient knowledge about each other’s interest results in individual influences as emotional reactions, which aggravate the disagreement between the organisations.

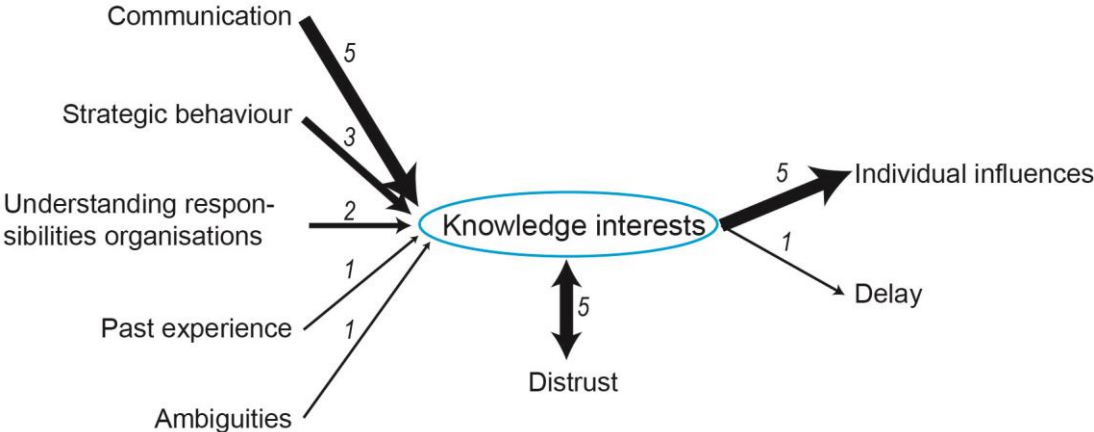


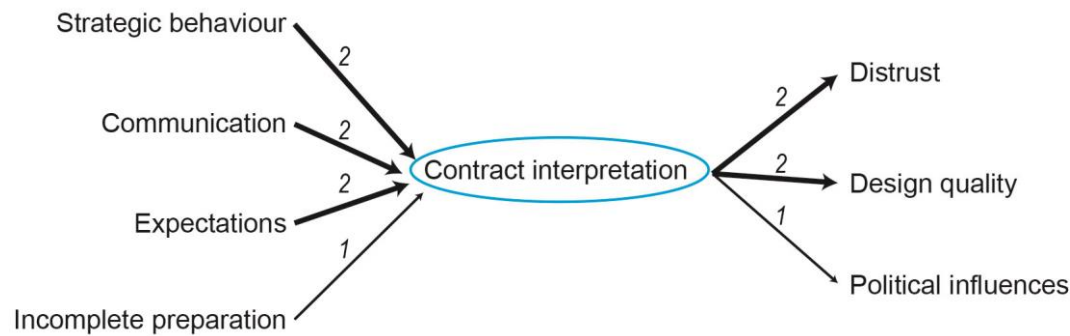
Figure 35: Interrelations 'Knowledge interests'

**Diverse interpretation contract**

Diverse interpretation of the contract implies a conflicting perception of the written terms in the contract, which both could be explanations of the terms. Interpretation of the contract has



no identified reciprocal relations, but also an absence of strong relations with other causes. CL\_07 describes the essence of problem with contract interpretations: *'A contractor bids a price with a certain contract interpretation, while the client believes he get what he wants for that price. When ambiguities are present, this will lead to discussions'*.



**Figure 36: Interrelations 'Contract interpretation'**

Interpretation of the contract can be caused by stuck communication, incomplete preparation, misaligned expectations or strategic behaviour according to the respondents. None of these causes are named by more than two respondents. Contract interpretation results in distrust or conflicts about design quality. The path of contract interpretation is described by CS\_05: *(...) We entered into an Arbitrage case, where a paragraph of the contract should be further specified. It took longer and was more complex than expected. That was interpretation about responsibilities and who should pay. (..). The absence of clarity resulted in a situation, which couldn't be solved. That resulted in a spiral, loss of trust, personal things and political influences.'*

## Distrust

The conflict cause distrust and lack of team spirit is mostly cited as potential cause of conflicts. Distrust implies a lack of trust or confidence in the other team. It shows reciprocal relations with the other six identified root-causes. Strategic behaviour, knowledge about each other's interest and expectations have the strongest relations with distrust. As the most important aspects of these relations are described previously, this paragraph will only elaborate on the relations outside these objectives. Agreement on the quality of design is related three times to distrust. According to CO\_08 the client will act suspiciously and try to find the catch in the design. CS\_05 describes the increased pressure on a project due to the absence of trust and the amount of changes. CO\_06 expands this by explaining that changes create moments where the organisations think in 'We' and 'They' terms. The moments are used, intentionally or unintentionally, to think suspiciously about the other. The qualifications

of the people influence the trust between the organisations in a positive way according to CO\_03 and CL\_05.

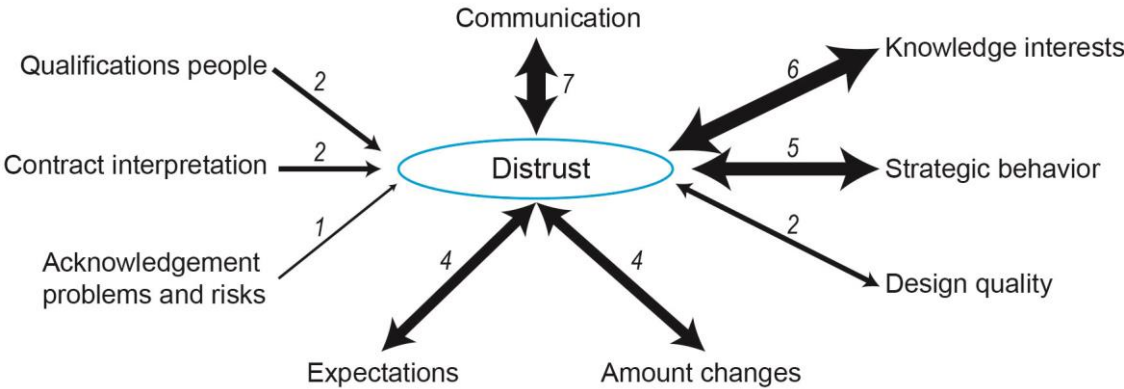


Figure 37: Interrelations 'Distrust'

5.1.7 Conclusion interrelations root causes

The interrelated network of the six root causes, which is composed based on above analysis results in Figure 38. The intensiveness of the interrelations with distrust is the highest, which indicates distrust is the strongest interrelated root-cause. Knowledge of each other’s interests and strategic behaviour has according to this model the strongest interrelation with distrust. Diverse expectations has less intensive relations, but is besides distrust the only influencing factor of strategic behaviour. Contract interpretation is explained by diverse expectations, strategic behaviour or stuck communication and affects distrust minimal. However ‘contract interpretation’ has the only one-sided relation with distrust. While this model is established by coding the 30 interviews, the conducted interrelations are only named literally by two till seven different interviewees. An explanation could be the *level of abstractedness* in this phase of the analysis. It is an analysis of the comments of the interviewees on the three highest and lowest scored Q-sort causes, which narrowed the spoken subjects per interviewee. This model will still be used to align the prevention methods with the identified root-causes, because the frequentness of the individual named root-causes is still respectively high. Also the principles of the three perspectives of the QM will be used to analyse the relations between conflict prevention methods and conflict causes.

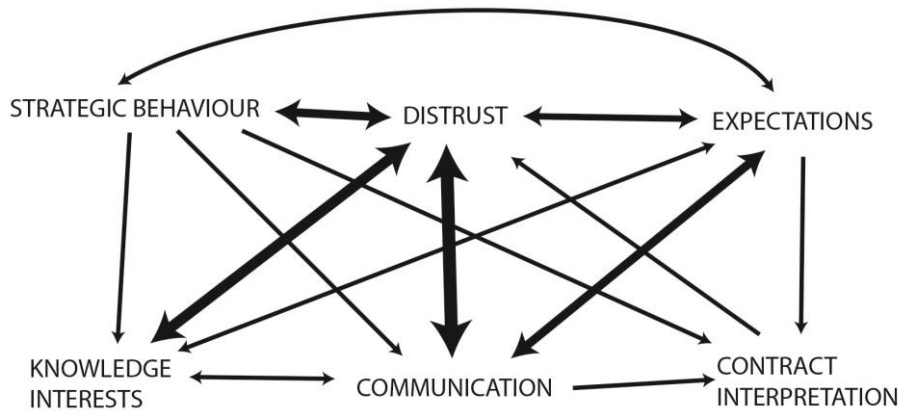


Figure 38: Interrelations six root-causes

## 5.2 Part B: Prevention methods and techniques

The interviewees are asked for their opinions regarding possible methods to prevent conflicts. The questions were separated into two parts; determination contract strategy and activities during the procurement phase. Conflict prevention methods incorporated during the determination of the contract are given by clients and consultants. Conflict prevention methods during the pre-contractual phase are asked to all the respondents. The questions are regarding their experience with activities during the pre-contractual phase, (a) which they experienced as beneficial to conflict prevention, (b) which they discourage for conflict prevention and (c) which conflict prevention methods they want to implement immediately.

### 5.2.1 Role-oriented or project-oriented approach?

During the interview respondents discussed prevention methods. They have associated those methods with certain values. Those values are compared with the values of the role- and project-oriented approaches. The values of the role-oriented approach are described in Paragraph 3.3.1 and the project-oriented values are described in Paragraph 3.3.2. The respondents discussed the values equality and fairness, openness and transparency and trust, but common objectives is not discussed by the respondents as required value to prevent conflicts. Optimising contract ambiguities and the professionalising of the preparation phase by the client are both discussed by the respondents.

Table 11: Incorporate values of prevention strategies

Project-oriented values		Role-oriented values	
Openness & Transparency	↔	Professionalism	
Trust		Clarity	
Equality and Fairness			
Flexibility			

**Openness and transparency** contributes to a trust-based relationship between client and contractor, explained CS\_08. Besides relationship building, transparency contributes to understanding of the made decisions during the procurement according to CO\_07 and CS\_09. Subsequently it provides opportunities to discuss ambiguities or interpretations of the contract. The professionalism of the client is needed to create a balance between an equal level playfield and the integrity about the contractors' solution.

**Equality and fairness** is less grounded than openness and transparency and has no further interconnections with other values. CO\_05 connects a relation based on equality to the objectives knowledge of each other's interests and trust. Equality results in a reciprocal relationship, where both client and contractor must be able to explain their interests and understand the other's interest. Equality is by CL\_02 related to speaking the same language. Fairness is named in relation with the distribution of risks and the possibility to discuss risks also in the pre contractual phase by CO\_02.

**Trust** is the most cited value by the respondents. CL\_03 relates the importance of trust to distrust, by stating distrust is most leading cause to conflicts and therefore trust should prevent conflicts. Respecting each other and take each other seriously is named by CL\_06, CL\_07, CL\_09, CO\_01, CO\_06, CO\_07 and CS\_04 as contributing factors of trust. CO\_06 explains the importance of trust during infrastructure projects as follows: *'It is simple. You're also not marrying someone, when you meet him for the first time. (...) Establishing a relation first is more than logic.'* The importance of trust during the pre-contractual phase is stipulated by CO\_07. CO\_07 makes a relation between trust and perceiving useful answers to questions, where confidential questions are shared when a certain level of trust is experienced. The need for behavioural rules and appreciation of those rules is named by CL\_04, CL\_05, CL\_09, CO\_06, CO\_07 and CO\_10 as positive governance mechanisms.

**Professionalism of client, contractor, contract and preparation** is named as precondition for trust, openness and transparency. The relation between the professionalism of the client and the contract is described by CO\_10 as: *"Clients should prohibit establishing a contract, which provokes cowboy behaviour. Contractor should compose a realistic price through risks analysis and includes the prices of the appropriate control measures. Lastly, the profit margin needs to be calculated and everyone is able to achieve his goals."* Professionalism also entails knowledge about the project content and having the time during the procurement to discuss also the content of the project states CO\_03. Clarity of information and clarity about

the contract is also described by nine respondents as improvement to increase the understanding of the interests of the client. CO\_04 and CS\_08 refer to the amount of information during a tender. Maximizing the clarity of the contract is by CL\_07, CO\_07 and CS\_03 named as important optimisation during the pre-contractual phase.

Thus a project-oriented approach is more related to conflict prevention methods by the respondents than a role-oriented perspective. However increased professionalism of the preparation on the side of both the client and the contractor is by the respondents related to increase values as openness, transparency and trust.

### 5.2.2 Conflict prevention within contract strategy

The clients and consultant were asked how conflict prevention is incorporated during the determination of the contract strategy. Not every consultant was sufficiently involved during the determination of the contract strategy. Thus the summation of all answers is not equal to 20. Two answers were mainly named as current strategies:

- Risk sessions
- Past experience

Risks sessions are internal organised sessions, where possible risks are identified and potential of conflicts will be incorporated according to the respondents. Lessons learned from previous projects or hurdles with comparable projects were incorporated in new contracts. Penalties or extra contract clauses were named as possible ways to include past experience in the contract strategy. Acharya et al. (2006) warns for this type of conflict prevention, when disclaimer clauses or limiting clauses are used to transfer risks to contractors without justification. However when past experience is used to transform theoretical based specification to a more field based (practical) specification, it can be effective to prevent contract with previous standard requirements (Acharya et al., 2006; Spiess & Felding, 2008).

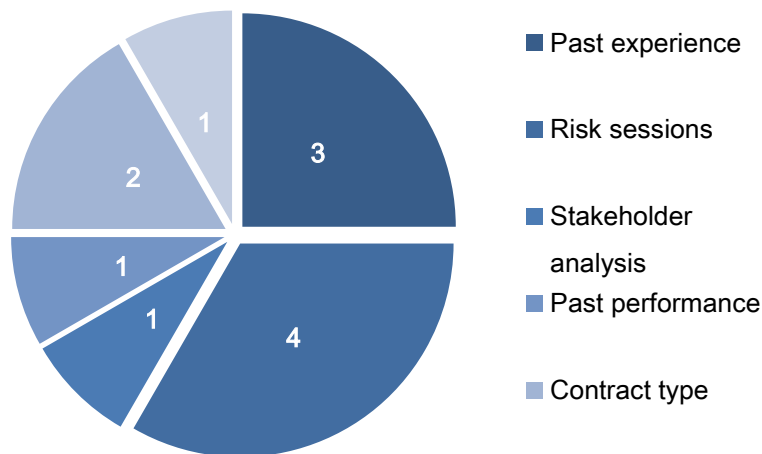


Figure 39: Current conflict prevention methods

### 5.2.3 Conflict prevention methods within procurement structures

Respondents were asked to their last few procurement processes and which activities from that procurement process had a beneficial effect on conflict prevention. Appendix D gives an overview of the given answers by the respondents and if those answers were also named in literature. Two elements corresponding with a project-oriented perspective were named most:

- **Dialogues**
- **Familiarity with each other in an early stage**

Dialogues are also an element, where client and contractor have the opportunity to get familiar with each other. However dialogues especially have also the aim to facilitate discussions about the content of the project. Familiarity also implies the preferences for a relational connection during the contractual phase. Even more important is that these two suggestions are named by all three types of respondents; client, contractor and consultant. Respondents describe the additional value of dialogues by stating it gives an opportunity to pay attention to the connection on relation level besides the technical project aspects. It is also used as opportunity to discuss possible solutions and verify if the interpretation of the tender is right. The significance of the answers is however not very high, the answers differ largely. The majority of prevention methods are named less than three times, which indicates a wide distribution of answers. Respondents referred to juridical adjustments as well as relational improvements. Two other suggestions, which had more than three votes, are highlighted in blue below in Figure 40.

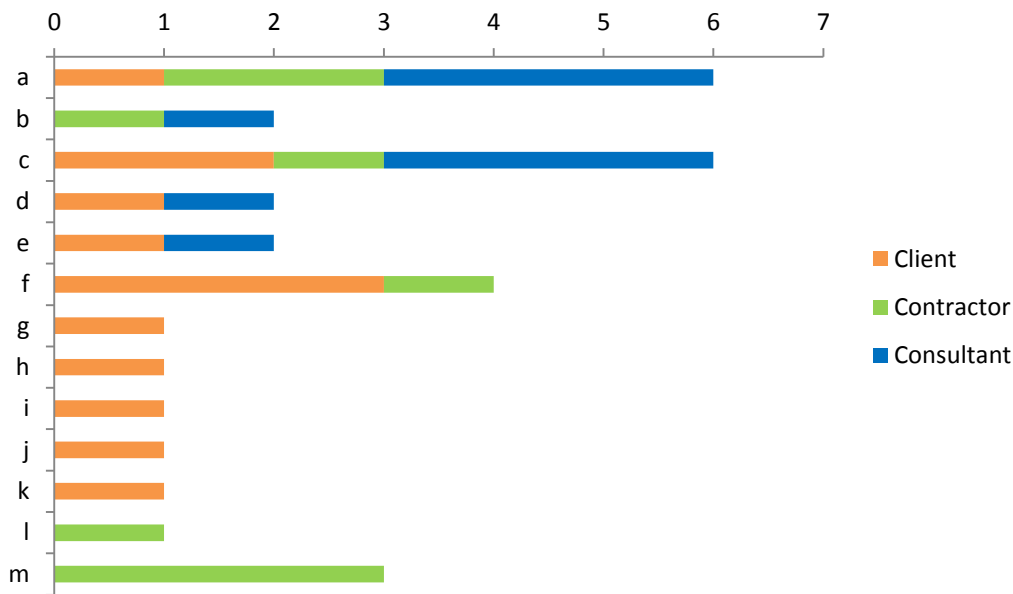


Figure 40: Conflict prevention preferences respondents

- a Dialogues
- b Reasonable risk distribution
- c Familiarity with each other in an early stage
- d Restricted procedure
- e Verification requirements and design
- f Selection on experience, quality
- g Past performance
- h Client should get his content right
- i Sharing risk register
- j Precise answering and questing during 'Nota van inlichtingen'
- k Notifications on the project site
- l To think along with the client on project and process problems
- m Consistency teams procurement and contractual phase

The **selection criteria** are also named more often as opportunity to stimulate qualitative solutions. Instead of selection a contractor on the lowest price, quality aspects and past experience should have more impact on the total score.

**Consistency in teams** is only named by three contractors as positive prevention method. They state consistency in teams enable the teams to move on with their gained knowledge

about the project and each other's preferences regarding this project instead of starting all over again with the contract as base point. It also facilitates that the first beginning of trust and getting familiar with each other can continue in the contractual phase.

A **reasonable risk distribution** is named only twice as preference. However on the question which element during the procurement process worsens the collaboration and increases the chances of conflicts, the most common answer is an unfair risk distribution. Therefore a reasonable risk distribution is essential. Contractor 10 stimulates to follow the guidelines of the UAV-GC. Literature also pays attention to the risk distribution. Roijen (2015) and Ng et al. (2007) stipulate the transparency of risks in an early stage and sharing the knowledge on risks.

#### 5.2.4 Unconditioned preferences conflict prevention

**More dialogues** also for smaller projects are named by five respondents and **more market consultations** are named by two respondents. The preference for more interaction in an early phase of the project is the most named preferences and is named by clients, contractors and consultants as well.

The unconditioned preferences of the respondents to prevent conflicts in the contractual phase by making adjustments in the pre contractual phase differ largely. **The alliance model** is named by three respondents (2 consultants and 1 contractor) as preference. This is an explicit example of a project-oriented approach, whereby client and contractor have common objectives and have shared responsibility of the risks. Their classical role is inferior to the project goals.

The discord against the **Procurement Law** is a notable result, as it is named by three clients as biggest obstacle of their possibilities to prevent conflicts. CL\_03 describes the first preferred adjustment during the procurement phase: '*The Procurement Law, because it does not suit collaboration in the building process. Let it go, release it completely.*' These three clients explain more flexibility is needed. Stressing the boundaries for a restricted procedure is named most as preferred adjustment in the current procurement law. Two respondents are consistent with this recommendation and prefer a procurement procedure with **a small amount of contractors**.



### 5.3 Conclusion results data analysis

The results of part A consists of the results of the factor analysis (QM) and the network analysis. The factor analysis resulted in three perspectives on conflict causes. The first perspective 'unpredictability and uncertainty', which has the most contributors, name distrust and lack of team spirit as most common cause of conflicts, followed by conflict causes related to the dynamics within projects as changing requirements, unforeseen contingencies and responsibility of risks. The second perspective 'human and behaviour' with seven contributors, who also valued distrust as most common cause of conflict. Additionally the seven highest valued causes are all process related causes related to human behaviour and communication. The third perspective 'Lack of clarity and competence' has nine contributors, which have quality of design valued as most common cause of conflict. Additionally causes related to information supply and communication show high scores. The network analysis on the relations made by the interviewees, while they were explaining their most or least common causes of conflicts, resulted in the six root-causes: distrust, strategic behaviour, stuck communication, misaligned expectations, insufficient knowledge of each other's interests and diverse contract interpretation.

The results of part B consists of the results on the named values pertaining to conflict prevention, contract strategy approaches and the analysis on the conflict prevention preferences for procurement processes. Mutual trust was named most in relation with conflict prevention methods and strategies. Also openness & transparency and professionalism of client, contractor or both were named frequently. The interviewees referred little to prevention methods of the literature study. The diversity of answers of the interviewees indicates limit consensus on effective prevention methods and causes low intensity of individual prevention methods. An explanation could also be the freedom of the interviewees related to the open questions during the interviewees compared to structured conflict causes by the Q-sort. However the analysis of the interviews derives clusters of the individual answers. The willingness for a *relational connection* before the start of the contractual phase is the most distinctive cluster, which indicates *a preference for the project-oriented methods* as conflict prevention. The interviewees have added dialogues to the list of possible prevention methods, because seven interviewees, consisting of clients, contractors and consultants, have named dialogues as effective conflict prevention method. Additionally procedural suggestions are made about selection criteria and the application of the Procurement Law by four respectively three interviewees.



# 6.

## Interpretation results & Discussion

The results of the data analysis of the Q-methodology and the network analysis resulted in the three derived perspectives on conflict causes and the six identified root-causes. The analysis of the additional semi-structured interviews provided insight into the used and preferred conflict prevention methods. Latter results represent the first and second research parts. The third research part entails the determination of the relation between conflict causes and the contract strategy. This chapter will elaborate on the following subjects:

- Relation factors Q-Methodology and conflict prevention techniques
- Relation root-causes and conflict prevention methods
- Compose process framework for pre-contractual phase
- Review on hypothesis and discuss findings

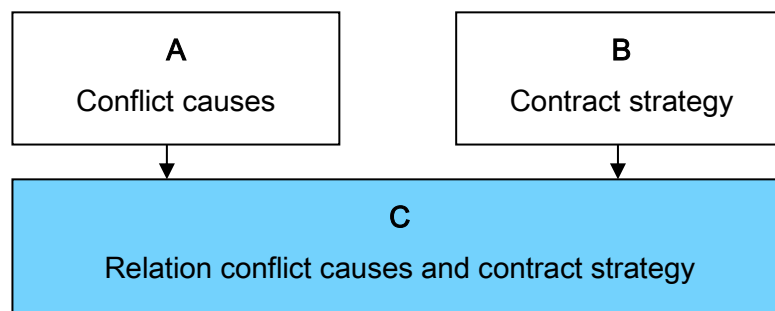


Figure 41: Part C: Relation conflict causes and contract strategy

### 6.1 Relation perspectives QM and prevention techniques

The first derived perspective 'unpredictability and uncertainty' defines distrust as most important conflict cause. It will be very difficult to develop or adopt adjustments during the pre-contractual phase, which will prevent all forms of distrust occurring in the contractual phase. However making an effort to establish a basis for trust will require more behavioural tools. This indicates a preference for the trust-based methods of the project-oriented approach instead of the control-based methods of the role-oriented approach. The relative

importance of contract ambiguities and the amount of changes does not immediately support this preference. Hypothetically, contract ambiguities and the amount of changes are consequences of the contract structure, which deviates from the understanding of the project activities. The perception of the contract occurs to increase opposing views of the involved client and contractor, which requires changes or clarifications of the contract to ensure the proposed results. These interventions show more similarities with the role-oriented methods. However preventing ambiguities without the involvement of the contractor will be very difficult, because estimation or guessing about possible ambiguities for another is complex and does not exclude the diverse perception of the remaining words. Thus, one-sided effort of the client to exclude ambiguities could improve the understanding of the meant project activities, but will be insufficient to exclude misinterpretations.

The second perspective 'human and behaviour' also defines distrust as most important cause, but supports this cause with the absence of open and transparent communication and the consequence of diverse expectations. Additionally knowledge of each other's interest is named by each contributor as most interrelated cause. The contributors represent projects with UAV-GC contracts and higher budgets. Could this imply that the impact of the interests related to these projects have higher consequences compared to smaller projects? Does this require more knowledge and respect of each other's interest to formulate the project goals? All high valued causes are process related, which aligns most with the behavioural tools of the project-oriented approach. However, interests could also imply more connection with task oriented methods to be able to discuss project interest and the associated interests of the involved client and contractor. Initiation of the client will not only be necessary to establish discussions about interests, but willingness to share these interests indicates also the need for active involvement of the contractor.

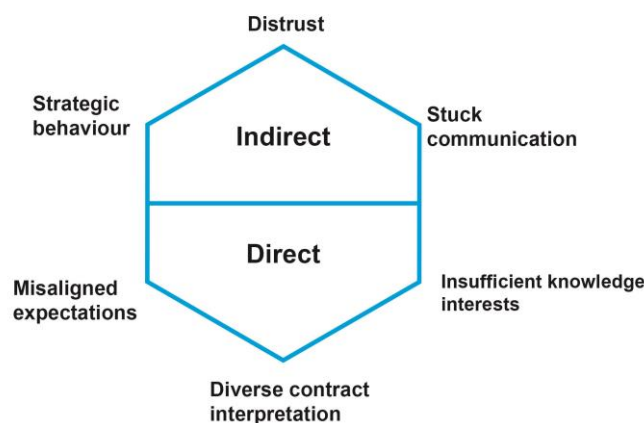
The third perspective 'Lack of clarity and competence' identifies stuck communication as most interrelated conflict cause. Effective interventions during the pre-contractual phase, which aim to prevent stuck communication during the contractual phase, will be hard to define. However behaviour tools focussing on the communication capabilities and the communication structure of the involved teams align potentially the most with the identified cause. This will also require the involvement of the contractor. Table 12 summarized the conclusions of this paragraph on the relation between the perspectives of QM with the conflict prevention techniques.

**Table 12: Relation perspectives QM and conflict prevention**

QM-perspective	Most distinctive cause of conflict	Method-goal	Method-owner
<b>Unpredictability &amp; uncertainty</b>	Project dynamics (changes, unforeseen contingencies) + ambiguities contract	Behavioural-oriented Contract-oriented	Initiative client, active involvement contractor
<b>Human and behaviour</b>	Knowledge of each other's interests + strategic behaviour	Behavioural-oriented Task-oriented	Initiative client, active involvement contractor
<b>Lack of clarity and competence</b>	Design quality and lack of communication	Behavioural-oriented	Initiative client, active involvement contractor

### 6.1.1 Relation root-causes and prevention methods

The root-causes consist of five process root-causes and one contractual root-cause. This indicates conflict prevention methods pertaining to process optimisation are more effective than prevention methods pertaining to project specific characteristics. The research is focussed on prevention methods during the pre-contractual phase. So the question remains which root-causes could be influenced during the pre-contractual phase? The relation between the root-causes and the conflict prevention methods will thus be analysed on the (1) possibility to influence the root-cause during the pre-contractual phase, (2) their possible impact on the prevention of conflicts and (3) the role of the individual and organisations.



**Figure 42: Influence pre-contractual phase**

During the pre-contractual phase misaligned expectations, knowledge about interests and contract interpretations might directly be influenced. However stuck communication, strategic behaviour and distrust are elements, which might only indirectly be influenced, see Figure 42. Distrust and communication are objectives, which are mainly important elements for the

relational connection during the contractual phase. Strategic behaviour is present both in the pre-contractual as the contractual phase. The vagueness and inimitable patterns of strategic behaviour are hard to affect directly during the pre-contractual phase. The pre-contractual phase however, provides the opportunity to at least discourage adverse strategic behaviour. Another issue is the possibility of measuring those root-causes. All these root-causes are unable to measure during the pre-contractual phase and therefore hard to exclude demonstrably. For example, knowledge about each other's interests is immeasurable even as the level of distrust or the misalignment of expectations.

The connection between prevention methods and root-causes are summarized in Table 13. The root causes, which have the potential to be directly influenced during the pre-contractual phase, have one common mean: dialogues. Achieving sufficient knowledge about interests corresponds with the goals of early contractor involvement, see paragraph 3.3.2.1 about project-oriented prevention methods. During dialogues the client is able to discuss or explain their interests. Dialogues also influence misaligned expectations and diverse contract expectations, when client and contractor are actually able to get familiar with each other, discuss expectations, discuss contract ambiguities and validate requirements and design solutions. Contractors have the opportunity to question vague or unclear interests. A clear contract requires professionalism of the client, but a definition of an example of a clear contract is hard to obtain. However besides a clear contract, ambiguities might be excluded by discussing those ambiguities. Dialogues provide those opportunities in theory. Thus referring to three root-causes, which could be directly influenced, the suggested conflict prevention method 'dialogues' and 'getting familiar with each other' captured these root-causes. The root-causes, which are indirectly or hard to influence during the pre-contractual phase, require additional effort. Attention for the relation connection provides the opportunity to establish a basic level of trust. However, stuck communication and strategic behaviour might not be captured by dialogues, which is undesired as both have an intensive relation with distrust.

Knowledge about interests or pronounced expectations both are soft factors, which are mostly not captured through a contract or other written documentation. Interests are mostly organisational specific, but expectations could be organisational and personal specific. This knowledge requires a relational connection between individuals, not only between organisations. Therefore consistency in teams contributes to benefit from the gained knowledge on expectations and interests. Thus consistency in teams is not a prevention method for conflicts, but could be more implied as a precondition. Without consistency in the

people involved in the pre-contractual phase and the contractual phase, the benefit of investing in the pre-contractual phase pertaining to conflict prevention is minimized. CO\_01 describes this as: *(..) Consistency is wishful, as a certain level of knowledge is gained, knowledge about discussed subjects in the tender phase. (...)*

**Table 13: Relating root-causes to possible prevention strategies**

Root-cause	Direct or indirect pre-contractual phase?	How to affect during the pre-contractual phase?	By which means?
Knowledge interests	<u>Direct</u>	<ul style="list-style-type: none"> <li>○ Getting familiar with each other</li> <li>○ Joint specification</li> </ul>	<ul style="list-style-type: none"> <li>● Dialogues</li> </ul>
Expectations		<ul style="list-style-type: none"> <li>○ Discussing expectations</li> <li>○ Getting familiar with each other</li> </ul>	<ul style="list-style-type: none"> <li>● Dialogues</li> <li>● <i>Relational connection</i></li> </ul>
Contract interpretation		<ul style="list-style-type: none"> <li>○ Improving clarity contract</li> <li>○ Discussing contract ambiguities</li> <li>○ Verification requirements and design</li> <li>○ Joint specification</li> </ul>	<ul style="list-style-type: none"> <li>● Improving clarity contract</li> <li>● Dialogues</li> </ul>
Distrust	<u>Indirect</u>	<ul style="list-style-type: none"> <li>○ Relational connection</li> </ul>	-
Communication		<ul style="list-style-type: none"> <li>○ Discuss communication structure</li> </ul>	<ul style="list-style-type: none"> <li>● Dialogues</li> </ul>
Strategic Behaviour		<ul style="list-style-type: none"> <li>○ Risk distribution</li> <li>○ Incentives</li> </ul>	<ul style="list-style-type: none"> <li>● Market consultation (testing risk distribution)</li> <li>● Selection criteria</li> <li>● Contract (incentives &amp; risk distribution)</li> </ul>

Selection criteria based on quality and experience provides the client the opportunity to increase the value of qualitative tenders, where the contractor meet the clients' expectations, interests and contract interpretation. However it only gives the opportunity to positively appreciate those tenders. It is not a solution to actually discuss the expectations, interests and interpretations. A reasonable risk distribution, only named by contractors, does not affect the identified root-causes directly. Only strategic behaviour could be limited, when the contractor prices the risks straightforward and is not tempted to price those risks opportunistically. Market consultations provide the opportunity to test the risk distribution with the contractors and subsequently discuss the selection criteria.

The conflict prevention methods, which connected to the identified root causes and three perspectives, are in first place market consultations and dialogues, summarized in Table 13. Process related root causes require process related prevention methods. Therefore an optimal prevention method provides room for discussion on process related objectives as expectations, behaviour and interests. A client (CL\_10) describes the need for interaction: *"(...) our knowledge and formalised ideas have increased enormously. Subsequently we need to translate these to the market, who haven't been through this process. We are on Venus, while the contractors are still on Mars so to speak. (...)*

## 6.2 Discussion results: The Process Framework

There is a restricted and an extensive process composed. The extensive process includes a market consultation, which provides a possibility to discuss the risk distribution and the selection criteria. This procedure is meant for the project with medium till large complexity, see Figure 44. The restricted procedure is meant for standard projects, where a market consultation is not necessary to determine a fair distribution of risks. Still one moment of interaction is necessary to prevent conflicts. It provides the opportunity to discuss interests, expectations and interpretations. Besides a dialogue also project instructions on site are possible, see Figure 43.

Above suggestions require effort and time from contractor and client during the procurement phase. Consistency in teams from procurement to realisation is required to benefit of this extra effort. Also the selection criteria of project should give the opportunity to select a contractor, which provides the best quality for a given price. Selection criteria mainly focussed on the lowest price are not preferred.



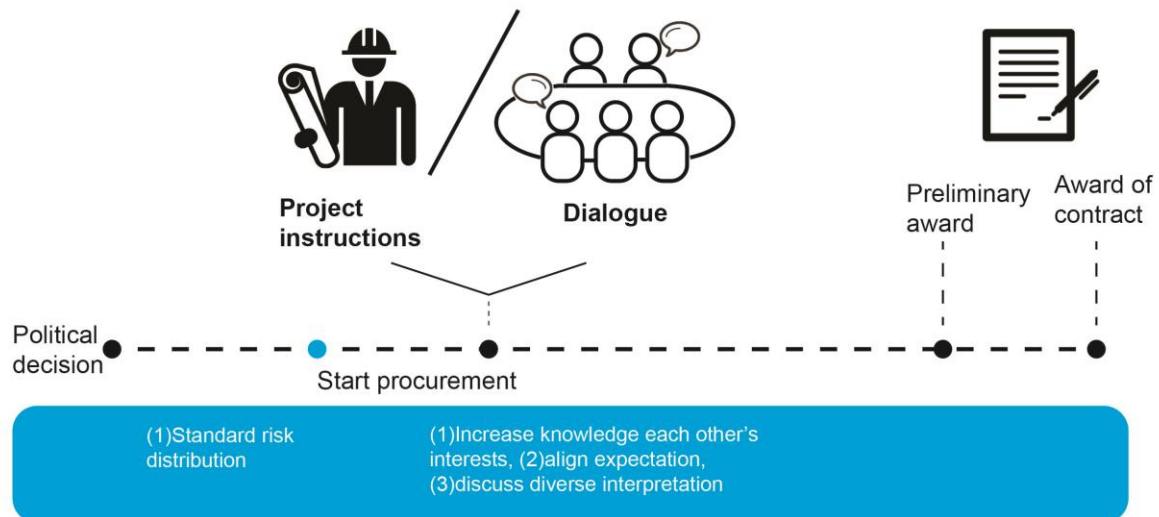


Figure 43: Restricted process to prevent conflicts

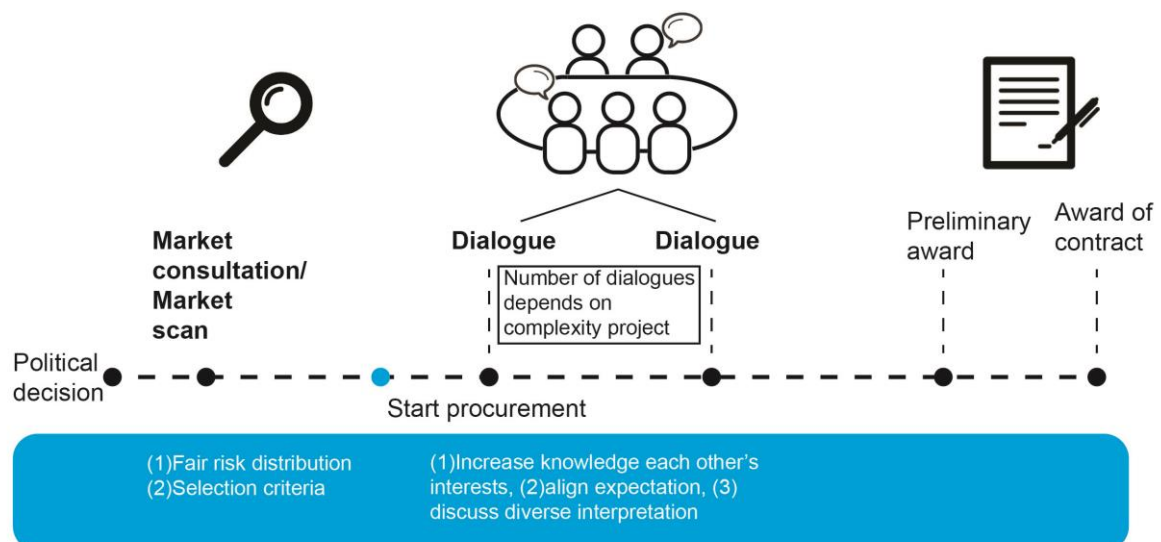


Figure 44: Extensive process to prevent conflicts

During the procurement phase, moment(s) where client and contractor are interacting are necessary to (1) increase knowledge about each other's interests, (2) align expectations and (3) discuss contract interpretations. The need for a prior negotiation stage is also acknowledged by Zaghoul and Hartman (2003) to build a trustful relationship between the contracting parties. Chow, Cheung, and Chan (2012) stipulate the need of physical interaction instead of use of online communication. The contracting organisations are more willing to openly share information during physical contact moments.

A market consultation contributes to a fair allocation of risks, when clients are unsecure of their proposed distribution. Zaghoul and Hartman (2003) stipulate the importance of a fair

risk allocation. Clients are extremely risk averse and transfer as many risks to contractors. This results besides more claim potential also in a more hostile environment between client and contractor (Zaghloul & Hartman, 2003).

During market consultations clients are able to test their risk distribution with the market. The selection of companies for these consultations should be done precisely, which prohibits exclusion or unequal competition in a later stage (Lenferink, Arts, Tillema, Valkenburg, & Nijsten, 2012).

The number of dialogues depends on the organisational and technical complexity of the projects. Multiple dialogues, 2 or 3, are complementary with multiple bids, which are discussed intermediate (Lenferink et al., 2012). The dialogue itself isn't the remedy for fewer conflicts, but the type of communication and the discussed substance during these dialogues will. An open attitude is required to discuss projects objectives as expectations, interests and interpretations. Discussion about the project content should be stimulated. Discussions only about the valuation of works (EMAT criteria) will increase the transparency about the final selection, but will not directly influence the identified root-causes.

The increased effort for the contractors has a negative side as not each involved contractor will continue during the contractual phase. According TCE (transaction costs economics) the cost will increase, which in case of winning the tender is less serious than in case of losing multiple costly tenders. Therefore attention should be paid to the total process time and the required products. Focussing on products, which contribute to a better alignment of expectations, knowledge of interests and diverse interpretations should be encouraged. Products which do not contribute to those elements should be excluded (Rijkswaterstaat, 2009)

## 6.3 Reflection on hypotheses

The analysis of the interviews resulted in the process frameworks, illustrated by the previous two pictures. This paragraph will reflect on the hypotheses about the causalities between the probability of conflicts, conflict causes and prevention methods.

### 6.3.1 Relation root-cause and probability of conflicts

Hypothesis 1 relates to the moment root-causes originate and the sequential process of causes leading to conflicts. The network analysis resulted in intensive and dynamic relations between the conflict causes. Also the factor analysis to the three different perspectives on

conflict causes showed relations between the causes. So, conflicts are indeed a sequential process based on a combination of events. The five causes with the highest average Z-values are pictured in Table 14. The origins of those root-causes are mainly in the pre-contractual phase. However, impact of changes is more a cause, which emerges during the contractual phase. The other four causes are incorporated in the six identified root-causes. The six identified root-causes with the most interrelations don't all originate in the pre-contractual phase. Stuck communication and distrust are both causes, which evoke during the contractual phase but could have an origin in the pre-contractual phase. Distrust, with an average Z-value of 1.80, has for example a strong relation with strategic behaviour, which has an origin in the pre-contractual phase. Strategic behaviour begins in the pre-contractual phase by composing the contract strategy through the client and the tender strategy by the contractor. Opportunistic behaviour is a frequently named root cause, average Z-value of 0.99, which causes suspicious behaviour of the client. Knowledge of each other's interest with an average Z-value of 1.13 is also a cause, which originates in the pre-contractual phase. Clients formulate their interests through the EMAT criteria or procurement documents, while contractor's interests could only be clarified during the pre-contractual phase if those interests are discussed or analysed in a way. Diverse expectations and contract interpretation are both examples of perceptions of the organisations, which both originate during the pre-contractual phase.

**Table 14: Causes with highest average Z-values**

Causes with highest average Z-values (QM)	Factor A	Factor B	Factor C	mean
<b>29 Distrust and lack of team spirit</b>	2.20	2.19	1.02	<b>1.80</b>
<b>32 Insufficient knowledge interests</b>	0.22	1.82	1.36	<b>1.13</b>
<b>8 Opportunistic behaviour</b>	1.05	1.53	0.40	<b>0.99</b>
<b>11 Lack of communication</b>	0.24	0.95	1.38	<b>0.86</b>
<i>28 Impact changes</i>	<i>0.61</i>	<i>0.83</i>	<i>0.60</i>	<i>0.68</i>

Thus, the results of the data analysis support hypothesis 1 with the notion that conflicts indeed are caused by a combination of events, but it does not implicate that all causes will originate in the pre-contractual phase. This corresponds with the theory of Vaaland and Hakansson (2003) and Sai On Cheung et al. (2009).

***H1: The root causes of conflicts originate in the pre-contractual phase as conflicts are a sequential process based on a combination of events (accepted).***

The family of hypotheses 2a-2c are related to the type of causes (project, process and contract). These three categories were not respectively of equal importance, see Appendix C.

The project related causes score alternately along the positive and negative axis. The first perspective 'unpredictability and uncertainty' scores the project related causes about risks and uncertainty respectively positive, while the third perspective 'lack of clarity and competence' scores quality of design as most common cause of conflicts. However none of the identified root-causes of conflicts are project related. Existing literature assign more value to project related causes. Cakmak and Cakmak (2014) and Sai On Cheung et al. (2009) appoint the project related causes as most important drivers for conflicts. S.O. Cheung and Yiu (2006) name all payment related causes as most important.

The interviewees were not asked to reflect on one project, but on their experiences of their last experienced projects. Subsequently the reasoning behind their valuation of the causes is also used as input. Project related causes may be more unique and project specific than the process related causes, which is determined for the frequency the respondents named the project related causes. This could explain the little references of the project related causes in the network analysis. For example, a conflict caused by insufficient quality of design could be explained by a lack of communication and insufficient knowledge of interests, while a conflict causes by delay of (part of) the project, could also be explained by these process related causes. The minor relation diversity of the project related causes could thus explain the underrepresentation of these causes as root-causes, because the intensiveness of the relations to project related causes is small. This type of assessment results in higher intensiveness of the relations with process related causes compared to project related causes. This may explain the absence of project related causes as root-cause of conflicts. Another explanation could be the difference between a conflict as disagreement and an escalated conflict as dispute. It may be the case that project related causes relate more to conflicts as disagreement and process related cause determine if a conflict further escalates. In short, based on the Z-values presented in Appendix C on project related causes and the six identified root-causes, hypothesis 2a is rejected. This is counterintuitive compared to the existing literature.

***H2a: Project related factors as information supply, quality, costs, time and risks are root-causes of conflicts. (rejected)***

The human and behaviour perspective scores all process causes higher than all project causes. The perspectives 'lack of clarity & competence' and 'unpredictability & uncertainty' both score process related causes alternately along the positive and negative axis. Distrust and lack of team spirit has the highest average Z-value (1.80). The other three high average scores, presented in Table 14, are also process related. Additionally the network analysis revealed that five out of six identified root causes are process related causes. These causes had the most interrelations with other causes and were most named by the respondents as most common cause of conflicts. Existing literature does elaborate on process related causes, but does not assign the same importance as above results to process related causes. Mele (2011) acknowledges the existence of process related and affective conflicts during the execution of projects, but assigns task related and role related with the same importance. Peterson and Behfar (2003) do refer to relationship conflicts, which are more detrimental than task conflicts, but relate them to past experience and negative performance feedback, which deviate from the results of this research. The explanation of the low scoring project related causes is also applicable on the high scores of the process related scores. The diversity of relations with the process relations may explain the high intensiveness of this type of causes, when interviewees are asked about their last few projects instead of referring to just one project. The common denominator is apparently more process related and recurring at more projects, while the uniqueness of projects may cause the more diverse spread of the project related causes. Thus based on the high average Z-values of the process related causes and the high representativeness of the process related scores as root-cause of conflicts, is hypothesis 2b accepted. This dominating role of process related causes for escalated conflicts is limited described in existing literature.

***H2b: Process related factors as human behaviour, management and market structure are root-causes of conflicts. (accepted)***

The scores of the contract related causes are structurally lower than the project and process related causes along the three perspectives of the Q-sort. Only contract ambiguities and the interpretation of the contract terms is scored as fourth common cause of conflicts by the 'unpredictability and uncertainty' perspective. Contradictory and error of information in mass of documents is by the first perspective 'unpredictability and uncertainty' and the third perspective 'lack of communication and competence' positively scored. However five out of the eight contract related causes have a negative average Z-value. Sai On Cheung et al. (2009) relate difficulties in performing a contract to a hostile environment, which is vulnerable for conflicts. The low scores of contract related causes could imply that both organisations

have minor difficulties in performing the contract. The low scoring inadequate quality of the technical specifications, average Z-value of -0.73, or lack of contractual details, average Z-value of -0.03, may imply the contract itself and the corresponding formalities are sufficient and does not need further improvement with the aim to prevent conflicts. Contrary is the representation of the contract related and identified root-cause contract interpretation with an average Z-value of 0.28, which is not an outspoken high score. However the interviewees used it frequently in their explanation for other causes. Based on the average low and negative Z-values of the contract related causes and the minor representation of these causes as root-cause, hypothesis 2c is rejected.

*H2c: Contract related factors as the contract structure, juridical procedures and official documents are root-causes of conflicts. (rejected)*

### 6.3.2 Relation contract strategy and conflicts

The family of hypotheses 3 describe the relation between elements of the contract strategy and the types of conflict causes. Hypothesis 1 has explained the finding of conflicts as a sequential process instead of a causal connection of one conflict cause to conflicts, which insinuates a combination of events is necessary for conflicts to escalate. Therefore the relation between one type of cause and one type of mean during the pre-contractual phase cannot be proved by this research, because the focus of the effectiveness of the prevention methods changed to their effectiveness on the combination of identified root-causes.

Hypothesis 3a relates to the causal connection between improvements of the procurement processes and the probability of conflicts causes by project and process related causes. This hypothesis cannot completely be accepted, because no data is acquired, which relates project related causes directly to prevention methods. However improvements of the procurement process by dialogues and an early relational connection, are ways to influence the process related root causes; diverse expectations, knowledge of each other's interests and contract interpretation. Besides, these process related causes have interconnections with multiple project related causes. Therefore hypothesis 3a can be accepted with the notion that the relation between process related causes and improvements of the procurement process is directly supported by the research analysis, while the relation between project related causes and improvements of the procurement process is only indirectly reducible. The informal aspects of the procurement process related to the establishment of a relational connection will be supported by Vaaland and Hakansson (2003) as they state informal mechanisms positively influence the level of trust. As this research

defined distrust as high contributing cause of conflicts, the findings are in line with existing literature, when deriving the conclusion that improvements of the informal aspects of the procurement process will decrease the probability of conflicts. However absence of quantitative data limits the strength of this accepted hypothesis.

***H3a: Improvements of the procurement processes decrease the probability of conflicts caused by project and process related causes. (accepted)***

Hypothesis 3b on the relation between contract structures and the probability of conflicts is not further analysed during this research, because the contract related causes have relatively low scores compared to other causes. Only contract interpretation is further analysed during the exploration for a relation between conflict causes and conflict prevention methods. None of the respondents reflected on the contract structures, when asked to effective prevention methods. Discussions and verifications were identified as possible methods to clarify interpretations. This rejection of the hypothesis can be supported by the finding of Vaaland and Hakansson (2003) that formal mechanisms as contract structures affect the predefined patterns of behaviour and procedures. These aspects are not identified as common cause or root-cause of conflicts and thus align with the outcome that improvements of the contract structure are not contributing to decrease the probability of conflicts.

***H3b: Improvements of the contract structure decrease the probability of conflicts caused by contract related causes. (rejected)***

Hypothesis 3c about the relation of governance mechanisms and conflicts caused by process related causes. According to Turner (2004) the ability to deal with unforeseen circumstances increases by appropriate governance mechanisms. The interviewees did not name communication structures as effective conflict prevention method. However predefined communication patterns may prevent stuck communication. Also the ability to deal with unforeseen circumstances would align with the objectives of the contributors of the first perspective 'predictability and uncertainty' derived from the factor analysis (QM). The minor reference to governance mechanisms is therefore conspicuous. The current contract strategies of the clients show more similarities with the role-oriented perspective. An explanation may be the absence of governance mechanisms during the pre-contractual phase. This may suggest governance mechanisms are only implemented during the contractual phase, which explains the minor comments of the respondents on effective governance mechanisms during the pre-contractual phase. Based on the derived important



causes of conflicts there could be more potential for effective governance mechanisms during the pre-contractual phase to decrease conflicts, but this relation is not further underpinned by qualitative data and therefore hypothesis 3c is rejected.

***H3c: Improvements of the governance mechanisms decrease the probability of conflicts caused by process related causes. (rejected)***

### **6.3.3 Relation orientation prevention methods and probability conflicts**

The hypothesis families 4 and 5 describe the relation between the orientation of the prevention method (role or project) and the probability of conflicts. Hypothesis 4a and 4b describe the role-oriented perspective and hypothesis 5a and 5b describe the project-oriented perspective.

***H4a: Conflict prevention methods in the pre-contractual phase decrease the probability of conflicts when performed by the client without interference of the contractor. (rejected)***

This hypothesis relates the type of involvement to the probability of conflicts. The client is responsible for the pre-contractual phase and optimising his processes. The ownership of the pre-contractual phase is straight-forward, but the involvement of and the connection with the contractors is less explanatory.

The question reveals if active involvement of the contractor is necessary for conflict prevention. The importance of dialogues and a relational connection suggest that the involvement of the contractor is necessary for conflict prevention. Discussions about expectations, interpretations and interests will only exist if opportunities where both client and contractor interact are created. Filling in the expectations or interests of the contractors by the clients themselves has not the same result, as the physical interaction is needed to trace also the underlying interests, expectations and interpretations. The last notion, ensuring a level playingfield is for clients extremely important. A mistake has the potential to result in juridical procedures, because disadvantaged contractors will seek legal redress. Therefore the clients prefer control-based methods as internal risk sessions and the usage of past experiences, where interferences with contractors are minimized. Also during the procurement process a slightly majority prefers methods, where involvement of the contractor is not necessary.



The reluctance of clients towards methods with involvement of contractors is slightly described by Kadefors (2004), who stipulated the absence of openness by clients and the cautiousness towards partnering activities during procurement processes. Eriksson and Westerberg (2011) relate it towards the knowledge and familiarity of the traditional procedures and the needed positive attitudes and confidentiality towards new procedures. As formal procedures are currently leading, this could explain the preference for methods without co-operation of the contractor. However based on the preferences of the respondents for methods with active involvement of the contractor and the identified root-causes, hypothesis 4a is rejected.

***H4b: Control-based prevention methods as excluding contract ambiguities and improving the information supply, decreases the probability of conflicts during the contractual phase. (role-oriented perspective). (rejected)***

The conflict prevention methods of the role-oriented perspective are not frequently named by the respondents as preferred methods. However contract interpretation is one of the identified root-causes. Thus minimizing the ambiguities could be identified as a potential effective conflict prevention method. However respondents explain that those interpretations should be discussed in an early phase. Interpretations of the written word will be done automatically. Besides, when communication is only in writing an opportunity to keep asking questions in case of misunderstanding is missing, this will further increase. Both parties will compose their perception of the meant written word. Eliminating ambiguous contract terms will be helpful, but will not eliminate every contract interpretation. Therefore the role-oriented viewpoints of excluding ambiguities out the contracts are not wrong, but additional discussions between client and contractor are needed to increase this clarity.

As describes also at previous hypothesis, clients prefer control-based method during the pre-contractual phase. Kadefors (2004) refers to the anxiety for juridical procedures between preliminary award and award and the vulnerable position of the client. Their reserved attitude towards more project-oriented prevention methods are based on previous experiences with contractors. Their focus on explaining failures instead of exploring more collaborative procurement procedures could relate to their public accountability. The strict procedures are a reaction on earlier Dutch fraud scandals, which could also explain the reluctance towards more collaboration in the pre-contractual phase.

Interesting is the relation of the anxiety for juridical procedures and the struggles of the clients with the current Procurement Law. These three clients refer to the limiting factor of the law related to flexibility of the process structure and the limited possibilities to collaborate during the procurement process. This could imply a difference between willingness for more collaboration and the prerequisites facilitating the ambition for more cooperation.

Based on the information of the respondents, where only one respondent referred to the content of the client, the need for control based to prevent conflicts is rejected. Interesting is the preference of the clients for these type of improvements compared to improvements which requires involvement of the contractor.

***H5a: Collaborative attitudes based on openness, common objectives, equality and fairness before the contractual phase of a project decrease the probability of conflicts during the contractual phase. (accepted, with the exception of common objectives)***

Collaborative attitudes between client and contractor are definitely appreciated during the pre-contractual phase. Especially openness is frequently named by the respondents as characteristic for conflict prevention. A certain level of openness during dialogues or market consultations is a precondition to discuss elements as interests, expectations and interpretations. If strategic behaviour dominates the dialogues and there is absence of openness about interests of stakeholders, expectations about the process and contract interpretation, the proposed effect of the dialogue may decrease.

An interaction based on openness, transparency, equality and fairness is related to a relation based on mutual trust. Subsequently distrust is valued as one of the most common causes of conflicts. This reasoning shows high similarities with the project-oriented approach. However professionalism of contracts and the preparation by both the client and contractor is also highly valued by the respondents. The respondents reflect to situations where unprofessional actions led to decreased level of trust and openness. The importance of changing behaviour of both the client and contractor is described by CO\_05: (...) *Starting with trenches will result in a long tough process, meaning we should change behaviour, but from two sides. (...)*

The need for openness during the contractual phase is named by Vaaland (2004) as relevant value for both conflict prevention and resolution. Suprpto (2016b) relates openness to better project performance, but not particularly to conflict prevention. So far, openness during the pre-contractual phase is not related as possible objective for conflict prevention methods.

Thus based on the named values in relation with prevention methods and their attention for openness & transparency and equality & fairness, hypothesis 5a is accepted with the exception of the value common objectives.

*H5b: Trust-based prevention methods as relational contract structures, partnering procurement strategies and early contractor involvement, decrease the probability of conflicts during the contractual phase (project-oriented perspective). (accepted with the exception of relational contract structures)*

Based on the theory, relational contract structures should increase the collaborative attitudes between client and contractor and have a positive influence on the level of trust, commitment, respect and fairness between client and contractor. All these objectives should align with at least the identified root-causes distrust and communication, but more commitment may also result in less misaligned expectations or more knowledge of each other's interests. Relational contract structures are however less frequently named as could expected. Sharing risk schemes cooperatively is named as suggestion to openly discuss risks, but is not frequently (only by one respondent) described as effective prevention method. The same entails for communication agreements on progress and problems. It is named by also one respondent. Thus according to literature relational contract structures should align with the identified causes of conflicts, however in practise this effect of relational contract structures is not experienced or the implementation of relational contract structures is not experienced. Therefore further research should be executed, but in this stage hypothesis 5b regarding relational contract structures cannot be accepted and thus will be rejected.

Partnering procurement procedures should according to literature contribute to collective attitudes and increase the level of trust, commitment and team work. These values align the most with the root-cause distrust and lack of team spirit. The level of partnering in the procurement processes could vary from elements based on competition, coopetition and collaboration. The preference for a few bids or even one bidder instead of a preference for open bid procedures is associated with procedures based on coopetition and cooperation. The other examples of Table 3 on partnering in paragraph 3.3.2.1 Project-oriented prevention methods are less mentioned by respondents. The difference between literature and practise is also present on this subject. An explanation may be the reluctance to relative new procurement procedures, explained at hypothesis 4b. However the respondents do refer to the need for a relational connection and dialogue as effective conflict prevention method.

Dialogues and the preference of a relational connection in an early stage show slight similarities with partnering procurement strategies. Thus, the preference for the bid invitations and the collaborative tools during the procurement processes show also some similarities between literature and practise. The most convincing partnering concept is the early involvement of contractors. Literature stipulated the increased constructability through the implementation of dialogues. The respondents mainly referred to positive consequences also on the establishment of a relational connection, which provides the first opportunity to build a level of trust. The opportunity to actually discuss substance is also named by respondents. The majority referred to dialogues as an effective conflict prevention method. The need for physical interaction between client and contractor aligns with the most important root-causes misaligned expectations, knowledge of each other's interests, diverse contract interpretation and contributes to the establishment of trust. Therefore hypothesis 5b regarding partnering procurement processes and early involvement of contractors is accepted with the notion that the gathered information is only confirming this hypothesis, but further research should prove the exact implications and possibilities of the implementation of partnering procurement processes.

## 6.4 Conclusion interpretation results

Thus, the QM-perspectives are more related to prevention techniques focused on behaviour with task- and contractual aspects. Subsequently those tools require beside the initiation of the client also the active involvement of the contractor. Three root-causes, knowledge of each other's interests, misaligned expectations and diverse contract interpretation, have the potential to be influenced directly during the pre-contractual phase. Trust-based methods have a more positive relation compared to control-based methods with the probability of conflicts. However during this research clear examples of relational contract structures or full partnering procurement strategies are not analysed. Only early contractor involvement is indicated as prevention method with some aspects of both relational contract structures and partnering procurement strategies, which resulted in a process framework. The causality described by H1 and H2b is relatively strong compared with the relation described by H3a and H5. These latter are more hypothesis, which requires further research to obtain more data on those relations, represented with the dotted line in Figure 45.

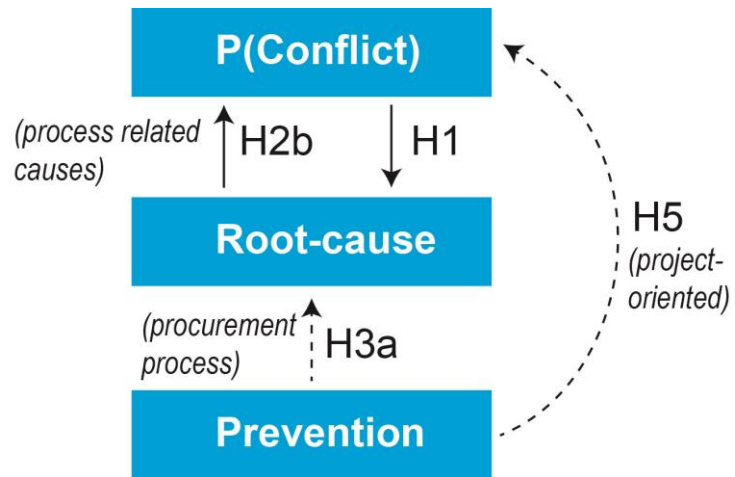


Figure 45: Accepted hypotheses



# 7.

## Validation

The results of the data analysis are based on 31 interviews, representing the clients', contractors' and the consultants' perspective on conflicts in infrastructure projects. The interpretation of the data resulted in a conceptual process framework. The validation of the results has the aim to evaluate the identified six root-causes of conflicts. Subsequently validate if the defined process framework prevents conflicts in the contractual phase. Two cases studies are used to analyse their conflicts and reflect on the used prevention methods. Additionally simulation games are conducted to validate the effectiveness of the process framework. Finally, meetings with external experts are organised to conduct a final check. The reliability and representativeness of the case studies, simulations sessions and expert meetings are discussed per subject.

### 7.1 Case studies

The case studies are two UAV-GC projects located in one of the larger Provinces. The budgets (33,4 M and respectively 7.2 M) represent medium till large projects of one type of client. The projects are executed by two different contractors. The result of this case study gives a first indication of the value of the composed model and could be generalised for other medium-large projects with integrated contracts and a larger Province as client. The results cannot be generalized for all the other clients and type of projects. Therefore additional case studies should be conducted in further research. The experienced conflicts (in the definition of this research) during the realisation phase are described per paragraph. The input for the case studies and the activities during the preparation phase are conducted from the clients' perspective.

Project	Contract	Procurement	Budget	
<b>A</b>	New crossing of two provincial roads	UAV-GC D&C	European	33,4 M
<b>B</b>	Multiple crossings of a Provincial road	UAV-GC D&C	Restricted procedure	7,2 M

### 7.1.1 Project A

Project A is a UAV-GC contract of a crossing of two Provincial roads. The engineering phase of this project was completed in 2013 and resulted into a detailed level of specifications. However there was chosen to procure an UAV-GC contract according policy guidelines. They had a restricted procurement procedure with a pre-qualification of 5-8 contractors.

There was a role-oriented perspective as the client was responsible for the pre-contractual phase without further personal interaction between client and contractor. There was an opportunity for individual questions, but is minor used by the contractors. The consistency in teams of the client was higher than the contractor.

The conflict itself was about the soil information in the tender and the risk distribution. The soil was not as good as the information had suggested, but the information was part of the appendix and intended as informative according to the client. This resulted in a different design between preliminary design and the definitive design stage based on research of the contractor themselves and a claim of 700.000 euro. The client had the perception the contractor should incorporate the risk of bad soil conditions. The contractor firmly believed the client should compensate completely as the information of the client was wrong. The impact of the design change also caused discussion. During the conflict, technical solutions and juridical procedures were main subject of negotiations. Subsequently the problem evolved in a more complex problem, only discussing change requests. This made it hard to find a solution. An external party has judged the claim, which resulted in a settlement.

In retrospect, the client describes the contractors' tender as opportunistic, because in their perception the contractor should have priced the risk: soil conditions. However this perception was not present at the project start. The client has shared his top risks during the tender. The contractors are judged via EMAT on their control measures and the associate price. The further interests of the client were also communicated via EMAT criteria and the procurement documents through penalties. During the evaluation of the project, it transpires not all interests are incorporated during the process. The contractor had multiple design solutions for the soil problem, but has not discussed them with the client referring to the important deadline with penalty. However the client would be willing to meet in time, when a cheaper solution was indeed possible. The penalty in the tender documents was perceived by the contractors as leading interest, where the nuance between time and money was not clear to the contractors.



At the start of the contractual phase the expectations about process, reviews, time, quality and maintenance are discussed. At that stage no conflicting expectations existed. During the evaluation between client and contractor after the project the different contract interpretations were discussed.

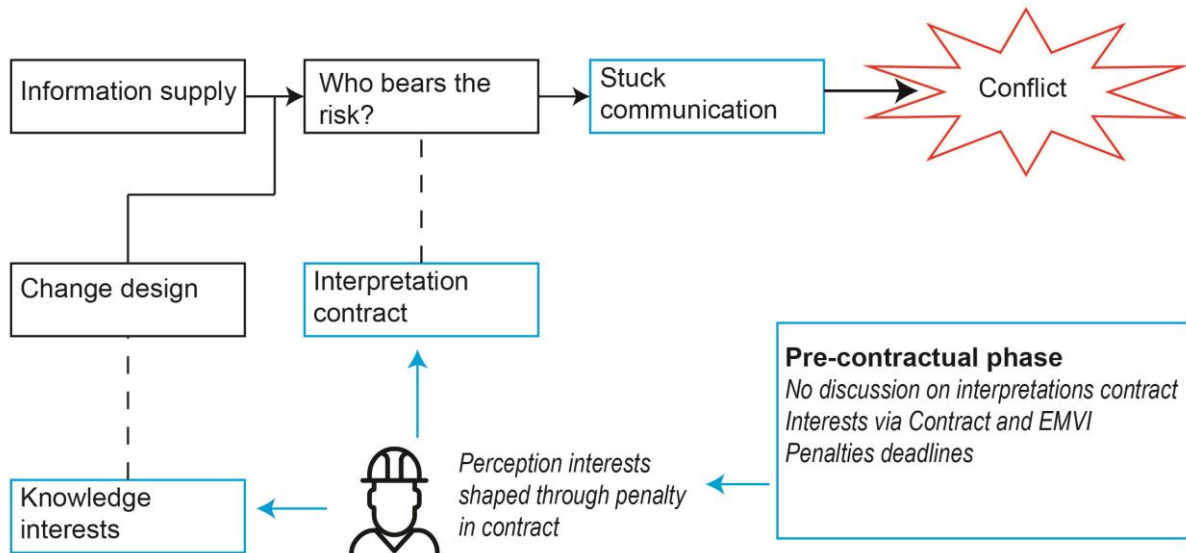


Figure 46: Summation case Project A

### 7.1.2 Project B

Project B consists of two UAV-GC contracts of multiple crossings of a Provincial road, two crossings are realised by one contractor and the other six crossings are realised by another contractor. They had a European restricted procurement procedure with one possibility for oral information with the aim to discuss design possibilities of the contractor. However the contractors only had questions regarding EMAT criteria. The PM refers to minor freedom in the contract and the limited progress of the contractors in that stadium as clarification.

Interpretation of a contract requirement in combination with misaligned expectations was eventually the conflict cause. This requirement was not discussed during the oral information possibility. Internal escalation led to a settlement. This settlement was chosen by comparing the consequences and interests of the settlement with the possible process costs associated with external escalation. Through discussions about expectations, behaviour and interests the parties succeed to settle before escalation was necessary.

There was no perception of opportunistic or strategic behaviour at the beginning of the project. A bonus on time is used as incentive to support early closure. Further interests of the client are openly discussed. In retrospect, safety is as interest insufficiently incorporated in the EMAT criteria. Expectations are discussed after the procurement procedure.

Communication patterns are discussed excessively on beforehand, also escalation models. This latter is according to the PM the main reason for early settlement instead of external procedures. Although the conflict regards contract interpretation, the other part of the contract is not received as ambiguous by the contractor. The level of distrust between the client and contractor was high before the conflict started, because of earlier irritations.

The PM explained it is almost impossible to discuss all contract interpretation beforehand, because contradictory interpretations are unforeseen events. Besides the preliminary discussion about the escalation model, the discussion about common interests after the claim contributed to an early settlement.

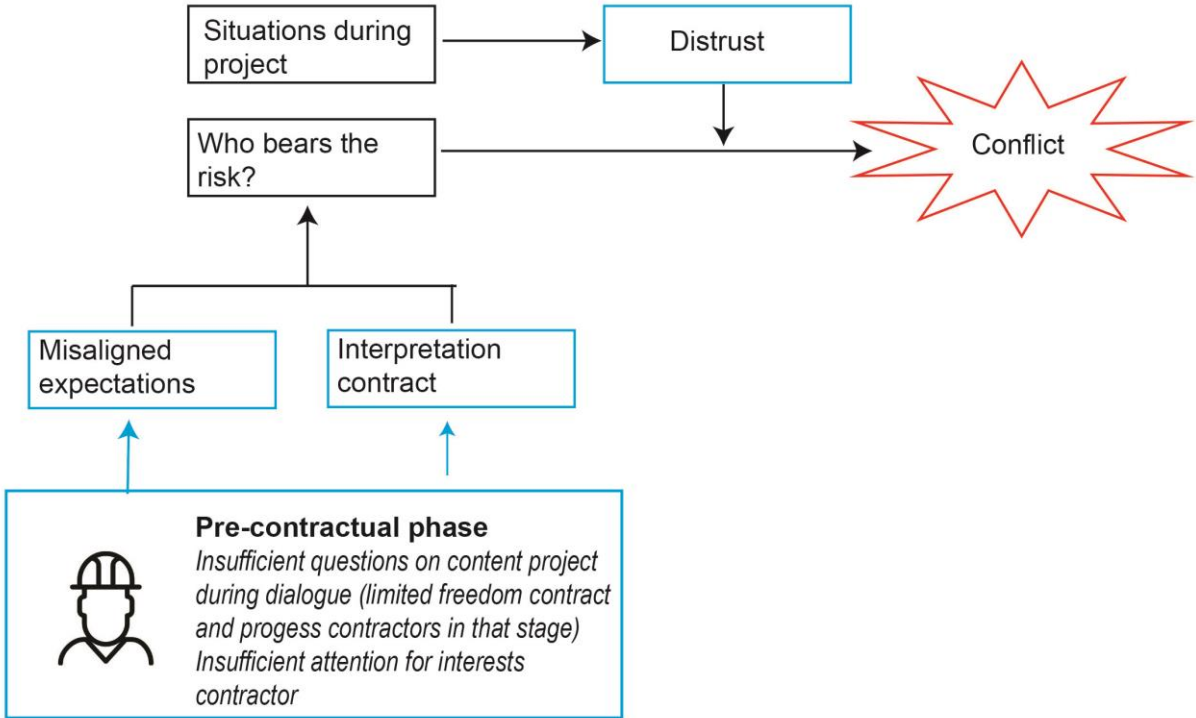


Figure 47: Summation Case Project B

## 7.2 Simulation sessions

The structure of the simulation sessions is based on the theory described in Chapter 2.3. The simulation sessions have the aim to test the conceptual framework. Validate if a dialogue during the pre-contractual phase decreases the probability of conflicts. The simulation games consist of two different sessions. Each session is conducted with six different teams, whereby three teams (1, 3 and 5) represent the contractor and three teams (2, 4 and 6) represent the client.

**Table 15: Structure simulation games**

Session 1: Contract negotiation without knowledge of conflict prevention			
Team composition	Negotiation 1	Negotiation 2	Negotiation 3
	Team 1: <i>Contractor</i>	Team 3: <i>Contractor</i>	Team 5: <i>Contractor</i>
	Team 2: <i>Client</i>	Team 4: <i>Client</i>	Team 6: <i>Client</i>
Session 2: Contract negotiation with knowledge about conflict prevention			
Team composition	Dialogue 1	Dialogue 2	Dialogue 3
	<b>Negotiation 4</b>	<b>Negotiation 5</b>	<b>Negotiation 6</b>
	Team 1: <i>Contractor</i>	Team 3: <i>Contractor</i>	Team 5: <i>Contractor</i>
	Team 2: <i>Client</i>	Team 4: <i>Client</i>	Team 6: <i>Client</i>

The subject of both contract negotiations are rejection of design plans. The client and contractor are individually briefed with information about the situation, which will compose their perception of the situation. It also includes information about the wishes of their own management, which aims to simulate realistic strategic behaviour. When the teams won't discuss their expectations, consider the other interests and verify their interpretations, the situation will probably escalate into a conflict. Probably this will influence the way the teams communicate and their level of distrust. The circumstances are mainly the same during the two sessions with the exception of the implementation of a 5min simulated dialogue before the second session. Thereby the influence of a dialogue is tested. Every session has two observers. They are instructed to observe the sessions based on the forms of Appendix E. The summation of these forms is given in Table 16.

### 7.2.1 Case 1: Rejected Design

The three contract negotiations about the rejected design have different outcomes. One session did find a solution during the session, but two didn't find a solution and needed a next meeting or escalated the situation.

The forms submitted by the participants of the simulation games show a different interpretation of the problem between clients and contractors, but also among the clients themselves. The three teams representing the contractor all have the same perception of the problem. Not discussing the problem will probably result in an ineffective conversation. Reading their approach to discuss this problem, most teams representing the client have an approach based on investigation of the possible solutions to their problems. One client (negotiation 1) refers to equality and fairness. The teams representing the contractors also prefer clarification about their perception of the problem. Two contractor teams state they want to maintain a good relation.

Negotiation 1 (with solution) expires in the beginning rough, which is identified by one of the observers as: 'They are not speaking the same language'. Subsequently the teams discuss the interests and expectations and release their organisational requirements. This results in discussions about the substance and consequently solutions, which can be done together. Negotiation 2 (without solution) expires trouble to discuss the content as the teams' perception of the situation is opposing. The teams cannot find common objectives. Contract interpretation is not discussed, even as the expectations of both teams. Interest are told, but not discussed. Negotiation 3 (without solution) expires also in the beginning rough, as both teams are surprised by the arguments of the other team. Teams speak from their own interest, but do not discuss them. The expectation to find a solution is shared, but mostly told from their perspective, which not results in a further discussion. The strategic behaviour of both teams is high. The client suspects the contractor of high cost for rework. The session results in a 'We versus Them' conversation. The teams listen very carefully but fail to further discuss statements.

### **7.2.2 Case 2a: Dialogue in pre-contractual phase**

The three dialogues during the simulated pre-contractual phase are the start of the second sessions. The client and contractor teams have their own objectives to discuss. The participants have the opportunity to discuss ambiguities before entering into the project. The submitted forms of the participants show all contractors require information about risks, safety and clients' preference for a good or a cheap design. The clients' approaches differ, the client (dialogue 1) describes their own interests, while the clients of dialogue 2 and 3 speak about openness, sharing knowledge and tracing interests. The contractor of negotiation 2 is after the session not sure all the interests are discussed. The client of negotiation 3 confirms process agreements have been made.

The observers of dialogue 1 ascertain a conversation based on questions, where contract interpretations and interests are discussed. Expectations about project characteristics are shared, but process expectations not. Also during session two expectations are not discussed, but interests are discussed excessively. Contract interpretations are not discussed. The observers of dialogue 3 state interests, expectations and contract interpretation is slightly discussed, but the parties fail to continue on earlier questions. Contract interpretation is discussed but forwarded to the next meeting.

### 7.2.3 Case 2b: Rejected design 2

The forms of the participants show a change in goals and approach compared to the goals of the negotiations of session 1. They both state to clarify the problem statement and search for solution possibilities. Listening and referring to the previous dialogue are named as approaches.

The observers of session 1 describe an early focus on the problem statement, where interests and the different interpretations of the data are discussed. Clear and straightforward communication results in consensus about the situation. The approach to investigate together possible solutions implies a more shared responsibility for the problem. The teams of negotiation 5 achieve to keep questioning and listen to each other. Discussion on expectations and interest is not succeeded. The sixth negotiation shows also another discussion atmosphere compared to the negotiation during session 1. There is a cooperative environment, where client and contractor are willing to think along and talk about a common interest. However there is still a strategic incentive to not openly discuss all the facts.

**Table 16: Summation outcome simulation games**

	Misaligned expectations	Insufficient knowledge interests	Stuck communication	Strategic behaviour	Distrust	Diverse contract interpretation
<b>Case 1</b>						
<b>Team 1+2</b>	Low	Medium	Low	Low	Low	Medium
<b>Team 3+4</b>	Not discussed	Medium	Low	Medium	Low	Not discussed
<b>Team 5+6</b>	Medium	Medium	Medium	High	Medium	Medium
<b>Case 2b</b>						
<b>Team 1+2</b>	Low	Low	Low	Low	Low	Discussed
<b>Team 3+4</b>	Not discussed	Not discussed	Low	Low	Low	Discussed
<b>Team 5+6</b>	Low	Low	Low	Low	Low	Not discussed

#### 7.2.4 Conclusion simulation sessions

What can we learn from the sessions? Is there a difference in approach between case 1 and case 2b? And how are the root-causes influencing the outcome of the simulations. The consistent low scores on distrust and stuck communication compared to the results of the data analysis on conflict causes could imply these objectives are more important in a longer process and are hard to simulate in just 20 minutes. The scores on the other aspects show more variety.

The difference between the sessions of case 1 could be explained by the different scores of the teams. Team 3 and 4 were not able to discuss the opposing interpretation and expectations, which relates to the inability to define a proper problem statement. The perception of both parties was too different and not discussed. The high level of strategic behaviour of team 5 and 6 contradicts the openness about their perception of the problems, which also results in tough conversation.

Comparing the scores of case 1 and case 2b shows immediately a difference. Teams 1, 2, 5 and 6 were all able to discuss their expectations and interests. A more open attitude resulted in an approach where both client and contractor were willing to find a common solution to the problem statement. Team 3 and 4 didn't succeed to find a solution within the session. They didn't discuss the expectations and interests, but did discuss the diverse interpretation. This could indicate they were able to identify the problem in general, but didn't reach the next level about interests and expectations related to the problem. A more collaborative atmosphere is thus created by a simulated dialogue in the pre-contractual phase. This enables the participants to refer to discussed interests and expectations, which resulted in a more cooperative approach to find a solution. However the balance between openness of objectives and strategic behaviour still determines the ability to define the actual problem statement.

### 7.3 External validation

Besides internal validation with the client's perspective, expert meetings are held. Besides a small questionnaire with 10 experts from the consultants' perspective, meetings with representatives of BouwendNederland, Pianoo en Traject Beter aanbesteden are organised to discuss the results. They recognized the findings regarding the root-causes of conflicts and the suggestions for improvement of the pre-contractual phase. The majority acknowledges the aim of preventing conflicts through dialogues. The need for openness

during dialogues is stipulated by all the experts as key success factor. Discussions about expectations are present during dialogues, but contract interpretations are discussed less open mostly out of strategic considerations. Additional comments were made on the position of procurement within the public clients.

- Position department Acquisition and the ascendancy of juridical procedures
- High level of strategic behaviour during market consultations hampers the proposed effect
- Economic research of the importance of trust within contractual relations
- Fair risk distribution is impossible based on economic interests

## 7.4 Conclusion Validation

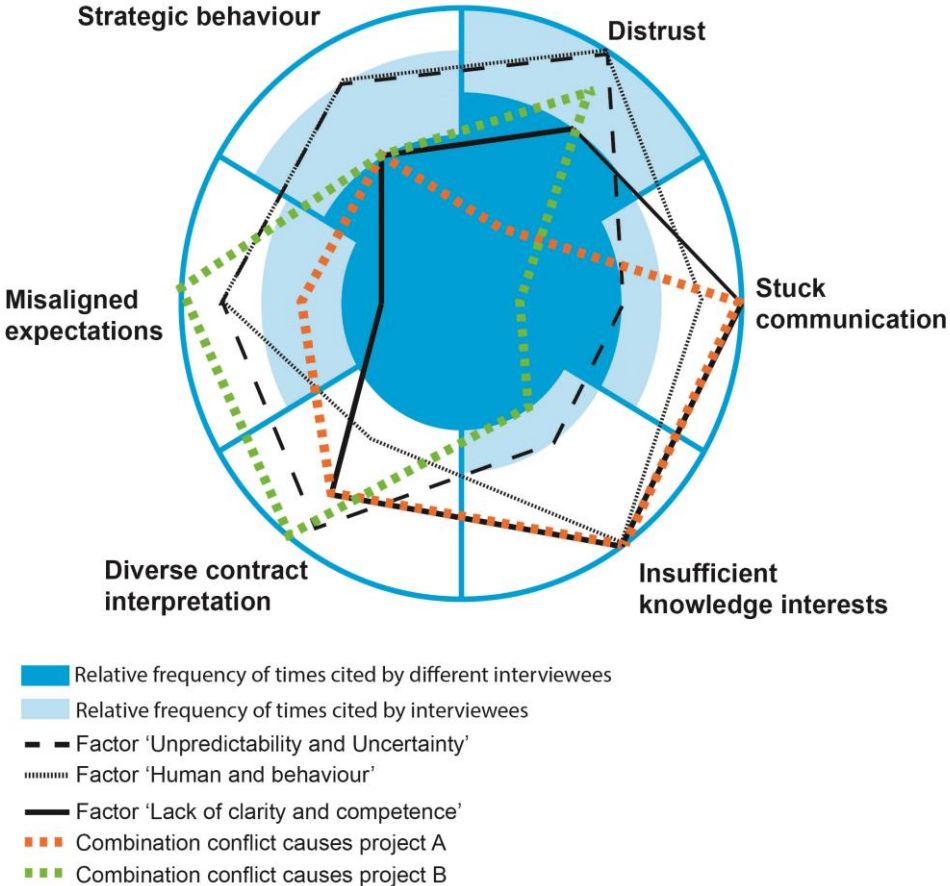
The combination of conflict causes of case study A corresponds with the human and behaviour perspective, where attention for the knowledge of interests is high, and the lack of clarity and competence perspective, see Figure 48. The combination of knowledge interests, stuck communication and other interpretation of information led to a conflict. The absence of discussion in the pre-contractual phase excludes the possibility to explain each other's interests. The perception of interests is done according to the penalties given in the contract. The conflict of project B corresponds with the unpredictability and uncertainty perspective, see Figure 48. The combination of ambiguities and different interpretation of the contractual requirements evolves in a conflict. The combination of predefined communication patterns during a conflict situation and the focus on common interests and best for project, prevent to further escalate the conflict. Both pre-contractual phases were based on the role-oriented perspective.

In comparison, the terms 'common' and 'together' were more used in the session after the preliminary dialogue. This cooperative environment tends to improve the ability to find a solution. However asking more in-depth questions and interrogating issues more thorough is still required identifying the real problem statement. A possible explanation is the reserved attitude of the involved participant, and might withhold information.

The combination of the projects and the simulation sessions shows that discussion among expectations and interests positively affect the solution seeking abilities of the involved parties. Contract interpretation can also be discussed during the preliminary phase, but unforeseen diverse interpretations are hard to predict and capture on beforehand. Therefore early made process agreements on communication, attitude and behaviour contribute to



preventing further escalating conflicts. However on beforehand implies multiple possibilities; predefined in contract, predefined in dialogues, predefined in project start-ups. The latter is outside the scope of this research. Reflecting on Project B the alteration of trust to distrust is a process, which is more complex to influence. In comparison, the scores on distrust during the second sessions with a cooperative environment were lower.



**Figure 48: Comparing case studies with identified root-causes**

In conclusion, the conflict causes of the case studies show similarities with the identified factors of the Q-methodology and the six root-causes. Limited empirical data is gathered about the relation between pre-contractual phase and actual conflict occurrence. However the simulation games and the case study both show positive results regarding process based agreements made on beforehand during physical interaction moments instead of only written formal communication about project substance. It results in a more cooperative environment, when both involved client and contractor are able and willing to communicate openly about interests, expectations and contract interpretations. A trend is defined towards more open communication and a cooperative atmosphere when a project-oriented strategy is chosen



instead of a role-oriented strategy during the pre-contractual phase. The final process framework is shown in Figure 49.

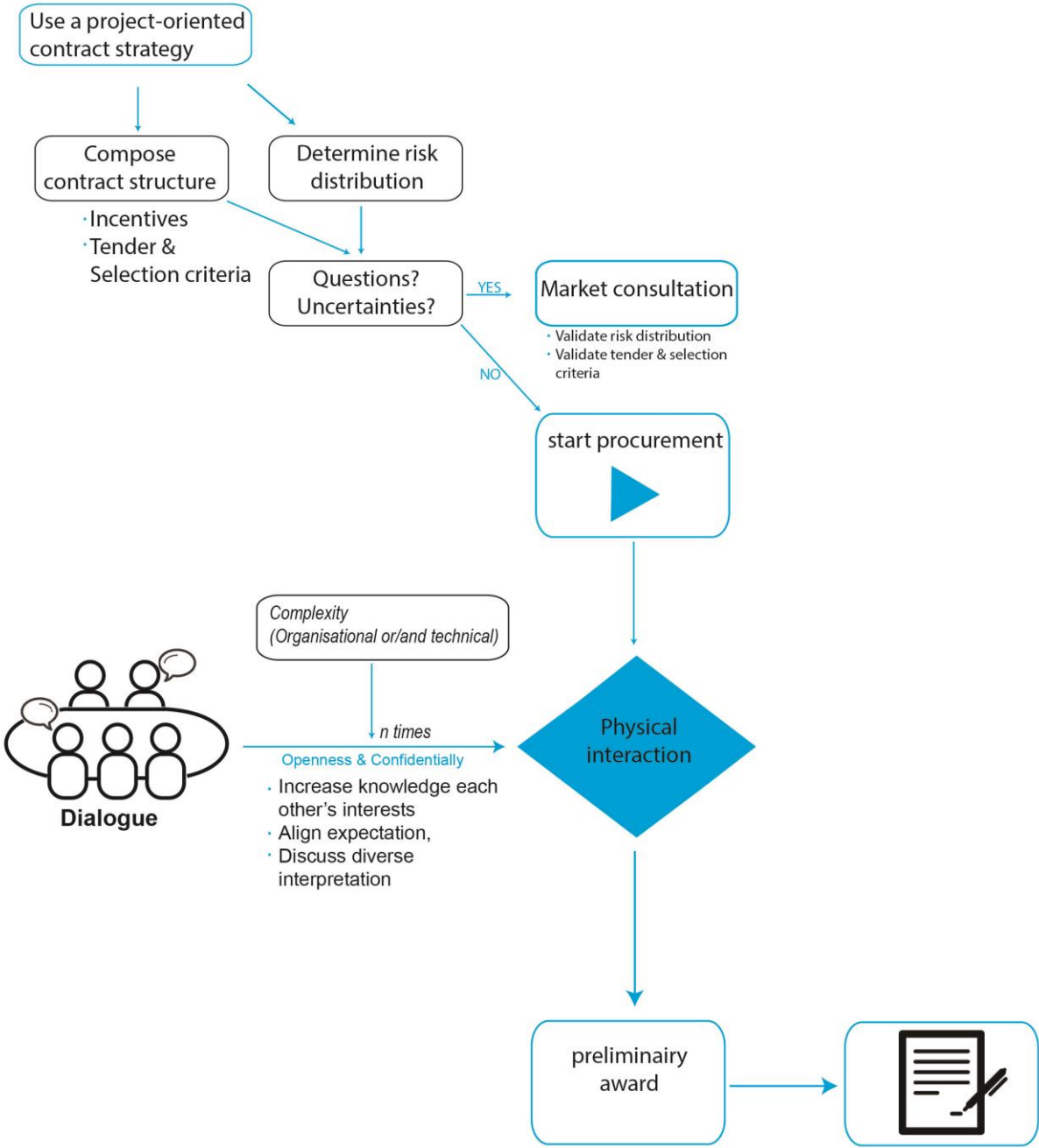


Figure 49: Final Process Framework



# 8.

## Conclusion

The research objective of this research is making adjustments to the pre-contractual phase with the aim to prevent conflicts during the contractual phase. Conflicts between client and contractor are detrimental in multiple ways; (1) negative effect on interrelations organisations, (2) ascending (litigation) costs and (3) decreasing group performance. The pre-contractual phase includes opportunities to prevent possible conflicts, because (1) the moment of the first interaction between contractor and client and (2) the official fixation of the collaboration is established during this phase. Therefore the main research question is: *'How to prevent contractual related conflicts during infrastructure projects before the contract is signed?'*

The main question is divided in three sub-questions corresponding with the structure of the research design. This conclusion gives answer to these sub-questions along the three part structure.

- Subquestion 1: What are the root-causes of contractual conflicts between client and contractor?
- Subquestion 2: What are possible adjustments during the determination of the contract strategy in order to minimize the probability of conflicts?
- Subquestion 3: Are those existing and additional prevention techniques effective in the current infrastructure projects?

### **Part 1: Root-causes conflicts**

The literature study resulted in a list of 32 conflict causes. These causes are divided in process, project and contract related causes. These causes were input for the interviews with contractors, clients and consultants. These 32 selected causes were identified as the possible causes, because the additions made by the interviewees were limited. Their selection led to three perspectives on the importance and contribution of the conflict causes to the probability of conflicts.

### 1. Unpredictability and uncertainty

This perspective is supported by 12 contributors, consisting of five contractors, three clients and four consultants. The combination of unforeseen contingencies, contract ambiguities and interpretations together with a high level of distrust between client and contractor evokes a conflict. Contract ambiguities and the amount of changes stress the level of distrust. Discussion on the responsibilities of risks is thereby a frequent discussion point. The conflict cause diverse expectations is by the contributors of this factor related to problems with local stakeholders, knowledge of each other's interests and distrust. The professionalism of client and contractor is in their opinion high enough, which limits ones individual influence on conflicts. Also the quality of design is valued as a non-common cause of conflict.

### 2. Human and behaviour

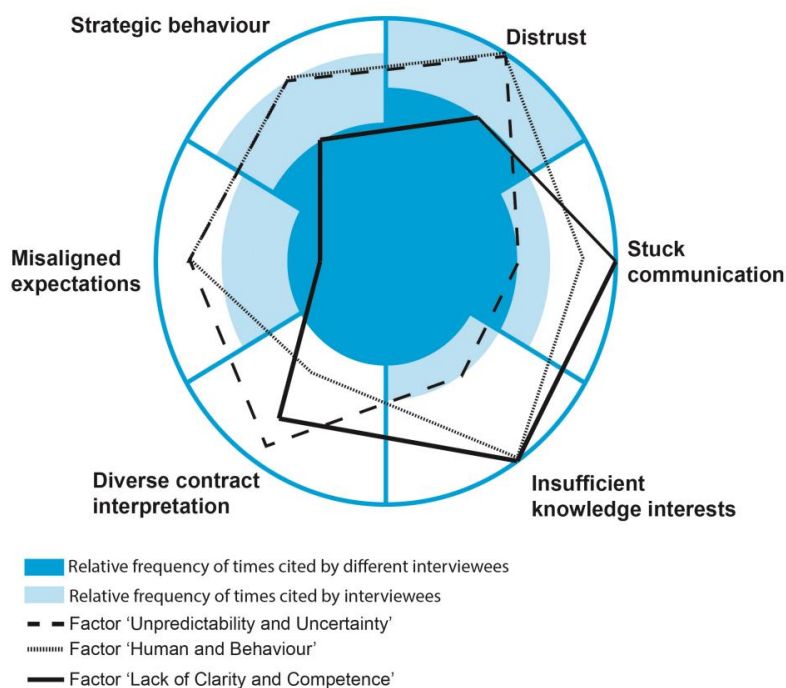
The contributors of this perspective have valued the process related causes as most important for escalating conflicts. Distrust in combination with insufficient knowledge of each other's interests results in a situation where both parties do not understand and respect each other. Unrealistic expectations of the client in combination with opportunistic behaviour of the contractor are a hazardous combination when occurring together. The seven contributors state that changes during the project, contradictions in documents or errors and ambiguities in the contract are negotiable, when the human factors have a sufficient level. The consultants are underrepresented in this perspective, while both client and contractor are represented equally.

### 3. Lack of clarity and competence

Lack of clarity and competence during the contractual phase of a project are the determining causes of conflicts according to the nine contributors of this perspective. Quality of design as project related cause is named as the number one cause of conflicts. The combination of insufficient knowledge of each other's interests and a lack of communication results in misunderstandings. This can lead to surprises to the other party in a project, whereby the parties block their further communication. Stuck communication hampers further converging of opinions. Unforeseen contingencies and acceleration of activities are identified as changing requirements and will be executed through the changing procedure. This is a straight forward procedure and will not result in escalated conflicts according this perspective.

The Q-methodology was used to prioritise the information on conflict causes. Beside the prioritisation, it was also a sufficient methodology to start the conversation with the interviewees. The representation of the different client, contractor and consultant is in general equal with a slight underrepresentation of the consultants in the human and behaviour perspective. However an additional network-analysis was necessary to identify the root-causes. This led to a complex network of causes, where six causes were most frequently named as interrelated cause.

1. Distrust and lack of team spirit
2. Stuck communication
3. Insufficient knowledge of each other's interests
4. Misaligned expectations
5. Diverse contract interpretation
6. Strategic behaviour



**Figure 50: Conclusion Part A: root-causes of conflicts**

A combination of these identified root-causes increases the probability of conflicts. The weight of these factors is pictured in Figure 50. Distrust has the strongest causality with the probability of conflicts and contract interpretation respectively the least. Besides diverse contract interpretation, all root-causes are process related. Distrust and stuck communication are elements in the contractual phase, which can only be indirectly influenced during the pre-contractual phase. Strategic behaviour is an objective, which can only indirectly be

influenced as it is behaviour as reaction on a combination of elements. Misaligned expectations, diverse contract interpretations and insufficient knowledge of each other's interests are causes, which originate in the pre-contractual phase and could be influenced more directly. Another distinctive characteristic is the immeasurability of these root-causes.

## **Part 2: Conflict prevention**

Two approaches on contract strategy and the additional prevention methods are distinguished based on literature research; the role-oriented approach and the project-oriented approach.

*The role-oriented approach* considers the pre-contractual phase as responsibility of the client and the contractor should not interfere during this process. The contractor is specified in the realisation of projects and has thus no further function in an earlier phase. The client should optimize the preparation of project by using control-based prevention methods as optimizing the contract and the information supply. Eliminating ambiguities from the contract, which could prevent diverse interpretations of the contract, is an example of a control-based prevention method. The information supply should be complete and reliable for the contractor.

The *project-oriented approach* stimulates collaborative attitudes during the pre-contractual phase between client and contractor. A cooperative environment will improve the further collaboration and therefore decrease the probability of conflicts during the contractual phase. Early contractor involvement, relational contracting and partnering procurement procedures are conflict prevention methods according to this perspective. These methods are trust-based prevention methods referring to openness, common objectives, equality and fairness.

The interviews provided additional prevention methods, but mainly practical specifications of prevention methods named in literature. The prevention methods based on the project-oriented perspective and the associated values openness, equality and fairness are mostly described as effective conflict prevention methods. The current prevention methods are mainly without interference of contractors out of anxiety for harming the level playingfield. Besides a defined process framework this research revealed the following conclusions about effective conflict prevention during the pre-contractual phase.

1. A project-oriented approach is a more effective conflict prevention approach than the role-oriented approach.

There is a preference for project-oriented prevention methods, which are based on the values openness, equality and fairness. Early commitment of the contractor in the pre-contractual phase and cooperative attitudes are approaches aligned with those values. This early commitment of contractors and cooperative attitudes is happening through physical interaction moments. Physical interaction is the preferred communication method as it provides the opportunity to question further and develop a relational connection, which indirectly influences the first level of trust. Interaction only on paper or online limits the ability to question further and react also emotionally on each other. Openness during these physical interaction moments is determent, which is closely related to strategic consideration resulting in withholding information. The cautiousness to openly discuss interests, values and goals by both parties is a complex obstacle related to distrust, which is difficult to exclude with one intervention. Transparency on the further processing of information will contribute to more openness even as the confidentiality about the professionalism of the other team and his associated activities. The combination of discussion on technical information about the project substance as well as the attention for a relational connections aims to (1) establish the first level of trust, (2) clarify contract interpretations, (3) increase knowledge about interests and (4) diverse expectations.

## 2. The content of the prevention tools crucially determines their effectiveness

Incorporating dialogues during the procurement phase or even market consultations in an early stage are not per se the solution to conflict prevention. The discussed substance and the interaction quality during these tools have great importance. Open communication supports identification of diverse interpretations or misaligned expectations. While a high extent of strategic behaviour or/and withholding information decreases this opportunity. Besides openness, also the relevance of the shared information contributes to the added value of the implemented prevention tools. Discussion remains of openness only relate to the willingness of the involved teams out of strategic considerations or it relates to the capabilities of the involved teams. Arguments for inadequate capabilities on open communication between client and contractor relate to the strict procedures and regulations introduced after the fraud scandals prevailed in 2002.

## 3. Establish the right preconditions

The preconditions do not influent the root-causes directly, but are aspects which contribute to the effectiveness of the conflict prevention methods.

First, consistency in teams is described as precondition to maintain the accumulated relation in the pre-contractual phase. The effect of the increased effort in the pre-contractual phase on expectations, interests, interpretation and trust building can be limited when a new team starts from scratch in the contractual phase. Second, determine a reasonable risk distribution, which prevents transferring risk to contractors, which are unmanageable risks for them. It shows relations with the values equality and fairness. Subsequently, it may decrease the incentive for strategic behaviour or unreasonable low prices. Thirdly, align selection criteria with interests as quality and experience. Selection based only on price stimulates opportunistic behaviour. The selection criteria based on quality and past experience gives the opportunity to steer with the criteria on interests of the client other than costs.



# 9.

## Limitations and recommendations

The results of this thesis provide adjustments for the procurement process with the aim to prevent conflicts during the contractual phase. Additionally this research has gained knowledge on the different perspectives on the conflict causes related to the perspectives of clients, contractors and consultants. This research has also its limitations, described in the first paragraph. Besides limitations, the research area is currently popular, but has enough other opportunities for further research on conflict prevention as objective during the pre-contractual phase. Recommendations for practise entail suggestions to improve conflict prevention on the managerial level.

### 9.1 Limitations research

This paragraph will reflect on the execution of this research and elaborate on three most important limitations of this research.

- Sensitivity of research objective in general
- Representativeness of respondents
- Reliability of methodology

Conflicts in infrastructure projects is a sensitive topic. The interviewees might *share information strategically*. As they talked about their experience, they might show strategic behaviour when explaining their reasoning behind conflict causes. They might choose beneficial examples for them to explain the origins of a conflict, but have reservations to share examples, where they are ashamed of.

#### **Representativeness of respondents**

The respondents of the interviews voluntary participated in the interviews. The willingness to share information about experienced conflicts and conflict prevention could indicate the interviewees themselves have a particular interest in the topic. A few interviewees referred to

previous own curiosity or workgroups on collaboration between client and contractors, which could imply they have certain *prior knowledge*.

The majority of the involved contractors and consultants represent national operating organisations, while the interviewed clients mainly represent local and regional operating organisations. This could imply the diversification of referred projects of the clients is limited compared to *the geographical diversification* of the projects of the consultants and contractors. The working experience of the interviewed clients, contractors and consultants is relatively large. Many years working experience in the same sector could result in *one-sided view* or even tunnel visions regarding objectives within their specialisation. The higher positions within the organisation of the interviewees could imply a deviation with the views of operational project managers of smaller projects.

### **Reliability of methodology**

The reliability of the methodology consists of reflection on the used analyse techniques of the interviews and the used analysing techniques of the validation. The Q-methodology was neutral methodology to start the conservation about experienced conflicts, but additional analysis techniques were necessary to be able to identify the root-causes of conflicts. The extracted factors defined by the quantitative analysis is a straight forward procedure, with only minor deviations of Z-scores when the same data is analysed by another researcher (Brown, 1993). The network analysis is a qualitative analysis, which is more sensitive for discussion. While executed according to structured coding plans, the interpretation of the data relates more to the capabilities of the researcher. Also the data analysis on conflict prevention methods releases more freedom to the researcher. During the interviews the conflict causes were not identified, while the researcher also investigated the preferences on conflict prevention. Therefore the questions on conflict prevention were not aligned with the latter defined conflict causes. Subsequently the composed process framework required a lot of interpretation of the researcher.

The internal validation is done with only one client. As the field of clients is heterogonous, the validation could limiting be generalised. The project managers of the studied were different from the participants of the simulation game. However the 'organisational culture' and type of client is still the same. The contractors are not incorporated in the validation of the process framework. It would be interesting to organise similar simulation games also with contractor to observe there change in behaviour. If there is still a tendency to withhold information or more openness also between 'real' contractors and 'real' clients could be established.

The reliability of methodology is also related to the value of the derived conclusions. The multiple parts of the research suits the explorative character of this research, as the identification of the root-causes had a lot of influence on the final proposed framework. The consequence is the limited amount of gathered empirical data about the causality between the actions in the pre-contractual phase and the actual effect on the contractual phase. The actual effect reflects on the consequences of that intervention or the influence of other or external circumstances. The derived conclusions should therefore be more interpreted as strong trends, which could be further researched.

## 9.2 Recommendations for further research

This research has elaborated on the relation between the pre-contractual phase and conflicts in the contractual phase. This paragraph will describe three suggestions for further research.

1. As the project-oriented perspective is the preferred contract strategy approach, projects with this approach have the most potential to finish without conflict. A portfolio of several projects with contract strategies based on the project and role oriented perspectives should be analysed on the root causes and escalating conflicts to further validate the suggested method.
2. Research to a fully project-oriented perspective during the pre-contractual phase. Thus establishing a process, completely project oriented. A fully co-operative process, where contractor and client define together the contract and define together the project interests would work to reduce conflicts.
3. Research to the contractor's perception during the project-oriented perspective. The feeling of being part of the process could also influence the effect on project collaboration. Thus if talking about interests and expectations is truly the benefit or that it has more influence, because the contractors have the perception they are involved.

## 9.3 Recommendations for practice

The managerial implications are divided in two subjects. First, improvement of the expertise about the procurement process and corresponding capabilities is discussed. This aims to effectively acquire the proposed information on interests, expectations and contract interpretations during the physical interaction moments of the pre-contractual phase. Second, the implications regarding the structure of the procurement process are elaborated. The

relation between confidentiality and openness is discussed and the ascendancy of procedures.

- **Increase expertise procurement process**

The final process framework entails the assumption involved parties during physical interaction have the competences to trace underlying interests and diverse expectations and contract interpretation. However this assumption can be questioned and practical capabilities regarding effective communication during the pre-contractual phase may be increased. *The listen and questioning capabilities* of the involved persons during the physical interactions should increase with the aim to benefit optimally of these interactions. Question techniques should be adopted, which succeed in acquiring the searched information. Listening techniques, which focus on the awareness of interpretations and perceptions of answers, can improve the alignment of the dialogue outcome between client and contractor.

Knowledge of the substance of the procurement process does not imply clients should increase their knowledge about the Procurement Law in general, because knowledge about these procedures is sufficient near to excellent. However the specialism to design the process instead of limiting the process to the architecture of the juridical procedures will increase the confidence to align the procurement process with the underlying goals of the project.

- **Openness and protecting the core values of both organisations**

Designing a process is described excessively in the book of Bruijn, Heuvelhof, and Veld (2010). They describe ways to establish openness and the protection of core values. Protecting the core values of both client and contractor increases the probability of incorporating both openness and confidentiality in the procurement process. Organisations or the teams representing the organisations will only be open if their core values are protected during the process. Core value of the contractor is confidentiality regarding their solutions, which contribute to their uniqueness and opportunity to have an advantage compared to the other bidders. This could be achieved by transparency about the distribution and processing of the information given by the contractor. Core value of the client is their political accountability. Secondly, they are obligated to keep a level playingfield during the procurement process, which ideally results in less juridical procedures about the selection. This requires besides effort of the client to manage the information supply also a change of behaviour of the contractors. Every contractor has the right to start legal procedures

regarding unfair selection outcomes, but extensive use of this right will also increase the anxiety for those procedures by the clients.

- **A process is more than following procedures**

Discussing the procurement phase, the separation between solely following procedures and designing the process is limiting. The Procurement Law is overruling the behaviour of client and contractor, which opposes the alignment of the process structure to each unique project as the same procedures are applied to different projects. Overly attachment to these juridical procedures results in cautiousness towards change of the prescribed patterns. This could imply obstacles for changing the process and behaviour of client and contractor during the pre-contractual phase. Therefore improving the confidentiality and ability to use the opportunities the Procurement Law entitles, may increase the difference between following the procedures and designing the process.



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# Appendix A

This appendix consists of 8 tables, presenting the conflict causes per category. The numbers before the possible causes are the original numbers from the list of 103 causes. The numbers only represent the sequence in which their sources (the articles) are analyzed. Therefore the numbers are not consecutive. This appendix will elaborate on the final formation of the list of statements for the Q-sample per category.

## A. 1. Change, uncertainty and risks

Nr.	Category 1: Change/uncertainty	Times cited	Processing
6	Risk allocation	5	Included in final list
7	Change of scope	5	Overlap nr. 98
8	Change of conditions	2	Overlap nr. 41, 98,100
28	External events changes	1	Overlap nr. 41, 98,100
30	Exceptional inclement weather	3	Adopted in number 41
41	Unforeseen contingencies as late changes and design variations	2	Included in final list
69	Percentage change original design	1	Included in final list
71	Failure to plan and execute the changes of works	1	Included in final list
98	Changing requirements	1	Included in final list
100	Unforeseen site conditions	1	Adopted in number 41

The first category regarding project risks and uncertainties resulted in five statements for the final list. Number 30 and number 100 are both examples of unforeseen contingencies and Therefore adopted in number 41. A change of scope is a general term, which is overlapping with number 98; changing requirements. Changing requirements is chosen as it is a more specific cause, which will mean to every respondent somehow the same. Change of conditions could be interpreted in several ways and has overlap with number 41, 98 and 100. The same holds for external events change. The adopted statements are:

1. Responsibility risks
2. Unforeseen contingencies as late changes and design variations
3. Percentage change original design

4. Failure to plan and execute the changes of works
5. Changing requirements

## A. 2. Contract, procurement and tendering

Nr.	Category 2: Contract/Procurement/Tendering	Times cited	Processing
12	Termination	1	Included in final list
13	Determination of the agreement	2	Interpretable
18	Tort related	1	Interpretable
19	Ambiguities contract terms	6	Included in list
21	Nomination	-	Outside scope
22	Re-nomination	-	Outside scope
51	Lack of contractual details, unclear formal procedures or unawareness of predefined patterns of behavior	1	Included in final list
57	Interpretation of contract provisions	2	Included in final list
73	Lack of understanding and agreement in contract procurement	-	Outside scope
79	Adversarial approach in handling disputes	1	Included in final list
84	Special conditions in the contract	1	Not included
85	Contradictory and error of information in mass of documents	1	Included in final list

The causes related to the nomination and re-nomination are outside the scope of this research and Therefore not included in the final list. The determination of agreement could be interpreted in several ways and could entail the negotiation, the contract terms or the process around it. The same holds for tort related and contract terms. Special conditions in the contract could overlap with nr. 57 the interpretation of contract provisions and is Therefore not included.

1. Termination
2. Lack of contractual details, unclear formal procedures or unawareness of predefined patterns of behaviour
3. Interpretation and ambiguities in contract terms
4. Adversarial approach in handling disputes
5. Contradictory and error of information in mass of documents

### A. 3. Costs and Budget

Nr.	Category 3: Costs/Budget	Times cited	Processing
17	Final certificate and payment	3	Included in final list
40	Cost of conflict and culture	2	Outside scope
66	Outstanding payment	2	Included in final list
67	Different percentage of claim submission and certification	1	Overlap nr. 68
68	Liquidated damages	1	Included in final list
87	Clients fail to pay for variation claims	1	Overlap nr. 66
89	Errors substantial changes in bills of quantity	1	Not included
90	Prolongation costs	1	Interpretable

Cost of conflict and culture cannot be the origin of the conflict, but is a consequence of a previous conflict. Number 67 has some interference with number 68 and cannot be the origin of a conflict. Therefore number 68 is chosen to represent those two causes in the final list. Number 87 also implies an outstanding payment, which overlaps number 66. Errors substantial changes in bills of quantity not included in the final list, because it is only cited by one author, which is less than the other causes. Prolongation costs could be interpreted in several ways. The following statements are included:

1. Final certificate and payment
2. Outstanding payment
3. Liquidated damages

### A. 4. Human behavior

Nr.	Category 4: Human Behavior	Times cited	Processing
2	Negative attitude	2	Not included
3	Unrealistic expectations	5	Included in final list
35	Dissimilar perceptions of fairness by the participants	1	Not included
59	Lack of team spirit	2	Combined with 64
64	Distrust	3	Combined with 59
95	Negotiation lacked experience	1	Not included
96	No leadership within project teams	1	Not included

101	Individual's ambition, frustration, dissatisfaction, desire for growth	1	Combined with 102
102	Individual's level of power, fraud and faith	1	Combined with 101

Number 3 and number 64 are cited most times and included in the final list. Number 2, 101 and 102 are combined into one cause named individual influences. Number 35, 95 and 96 are only one time cited and not adding additional value to the other already selected causes. Number 35 could overlap with number 3. Number 95 and 96 show overlap with individual influences represented by number 101 and 102. The following statements are thus included:

1. Unrealistic expectations
2. Distrust and lack of team spirit
3. Individual's influence (level of power, ambition, dissatisfaction and desire for growth)

#### A. 5. Information

Nr.	Category 5: Information	Times cited	Processing
23	Availability of information	5	Included in list
48	Unclear perceptions of decision patterns	2	After test sessions included
58	Lack of communication	4	Included in list
74	Reluctance to seek clarification	1	Not included

Availability of information is mostly cited and therefore included in the final list. Lack of communication is cited 4 times and also included in the final list. Number 48 is included after test sessions, where 3 of the 5 experts suggested this independently and without a showed list. They didn't identify decision patterns in particular, but communication patterns in general. This resulted in the following statements:

1. Availability of information
2. Unclair communication patterns
3. Lack of communication

## A. 6. Management

Nr.	Category 6: Management	Times cited	Processing
63	Administration and management	3	Overlap with 67, 101, 102
70	Supervision and coordination of contractor by client	1	Included in final list
83	Previous working experience	1	Not included
97	Frequent owner interference	1	Overlap with nr. 70

While number 63 is mostly cited, is it not included in the final list. Administration and management is more a generic term and could entail also elements of an outstanding payment or individual's influence. Number 70 and 97 are combined into one statement as owner interference is part of the way a client supervises or coordinates the contractor. Previous working experience is not included. This resulted in only one contributing statement:

1. Supervision and coordination of contractor

## A. 7. Market structure

Nr.	Category 7: Market structure	Times cited	Processing
1	Difference in needs, interests, values and preferences	3	Overlap with nr. 45
38	Opportunistic behavior	1	Included in final list
39	Contractor financial position	2	Overlap with 38
43	Drives for autonomy	1	Not included in list
45	Lack of understanding about the domain of the parties	1	Included after test sessions
46	Ambiguous roles and interface problem	2	Included in final list
49	Interdependent resources and activities	1	Not included in list
50	Interaction between professional and non-professional groups	1	Re-formulated after test sessions
61	Fragmented structure of the sector	1	Overlap with 38

Number 1 and 45 are included after the test sessions with experts. The financial position of the contractor (nr.39) and the market situation (nr. 61) will determine the urgency for opportunistic behavior and are Therefore combined into one possible cause. Ambiguous roles and interface problem is included in the final list, because of times cited and the diversity. Interaction between professional and non-professional groups is reformulated after the test sessions with experts to the interaction with political groups. Number 43 and 49 are excluded in the final list. They are both only one time named in an article and do not stipulate additional themes within these category. This resulted in the following statements:

1. Insufficient knowledge of each other's interest
2. Opportunistic behaviour
3. Ambiguous roles and interface problem
4. Political influences

### A. 8. Task and Quality

Nr.	Category 8: Task/Quality	Times cited	Processing
15	The site and execution of work	2	Overlap with nr. 8, 28, 30, 41, 100
25	Negligence	2	Interpretable
27	Design errors	2	Combined with nr. 56
47	Goal incompatibility, commitment and involvement	1	Overlap with 59 and 101, 102
53	Technical inadequacy of the contractor	1	Not included in final list
56	Quality of design	1	Included in final list
62	Quality of technical specification	1	Included in final list
75	Inadequate CPM and update requirements	2	Overlap with nr. 98
76	Unfamiliar with local conditions	1	Overlap with nr. 8, 28, 30, 41, 100
88	Clients take over site and deny access to main contractor	1	Overlap with 70



92	Measurement and valuation contracted work	1	Included in final list
99	Problems with neighbors	1	Reformulated

Number 27 and 56 are combined as one cause both regarding the quality of design. The quality of the technical specification is included, because it stipulated a different theme within this category. Measurement and valuation of the contracted work is also included based on the same reasoning. Problems with neighbors is reformulated to problems with local stakeholders. Local conditions and site conditions overlap with an earlier adopted cause regarding unforeseen contingencies of local conditions. Number 25 could entail several themes and is therefore not incorporated. Number 75 has overlap with changing requirements. Clients take over site and deny access to main contractor is part of the way they coordination and supervision and therefore not additionally included in the final list. Number 53 is not included in the final list as it does not access a different theme and is only one time cited. The resulting statements are:

1. Quality of design
2. Quality of technical specification
3. Measurement and valuation contracted work
4. Problems with local stakeholders

## A. 9. Time

Nr.	Category 9: Time	Times cited	Processing
11	Acceleration	2	Included in final list
29	Interferences with utility lines	1	Included in final list
31	Delayed design information	2	Part of 34
32	Delayed site possession	4	Part of 34
34	Postpone part of the project	2	Included in final list
93	Late instructions from architect and engineer	1	Part of 34
94	Contractor fails to proceed in competent manner	1	Part of 34

Postpone part of the project is a combination of the statement with causes of this delay, which could be delayed design information, delayed site possession, late instructions or the contractor fails to proceed. Acceleration is a different time within the category time and

therefore included in the final list. The same reasoning holds for interferences with utility lines. The resulting statements are:

1. Acceleration
2. Interferences with utility lines
3. Postpone (part of the) project

The final list is:

Nr.	Statements	Category
1	Unrealistic expectations (customer)	Process
2	Acceleration activities	Project
3	Termination contract	Contract
4	Final certificate and payment	Project
5	Availability of information	Project
6	Delayed by other contractors employed by the client (e.g. utility companies)	Project
7	Postpone part of the project	Project
8	Opportunistic behaviour	Process
9	Ambiguous roles and interface problem	Project
10	Quality of design	Project
11	Lack of communication	Process
12	Quality of technical specification	Contract
13	Outstanding payment	Contract
14	Liquidated damages	Contract
15	Percentage change original design	Project
16	Supervision and coordination contractor	Project
17	Failure to plan and execute the changes of works	Project
18	Adversarial approach in handling disputes	Contract
19	Contradictory and error of information in mass of documents	Contract
20	Measurement and valuation contracted work	Project
21	Changing requirements	Project
22	Unforeseen contingencies (late changes, design variations, (site) conditions, weather etc.)	Project
23	Responsibility risks	Project
24	Contractual details	Contract
25	Interpretation and ambiguities in contract terms	Contract
26	Individual's influence (level of power, ambition, dissatisfaction and desire for growth)	Process

27	Problems with local stakeholders	Project
28	Impact changes	Project
29	Lack of team spirit or distrust	Process
30	Communication patterns	Process
31	Political influences	Process
32	Insufficient knowledge of each other's interest	Process



# Appendix B

## Interview guide

### Checklist vooraf:

- Voice recorder aan
- Anonimiteit gegarandeerd
- Introductie onderzoek
  - o Voorkomen van conflicten, die tijdens de uitvoering aan het licht komen, door hier vroegtijdig op te sturen.
  - o Termen onderzoek:
    - Conflict: Wanneer project managers op het project het oneens zijn met elkaar en dit niet kunnen oplossen met de mensen op het project.
    - Opdrachtnemer: Met de opdrachtnemer wordt hier de aannemende en uitvoerende partij bedoeld. Adviesgevers worden buiten beschouwing gelaten.
    - Opdrachtgever: Alleen publieke opdrachtgevers worden in dit onderzoek meegenomen.
    - Precontractuele fase: De fase van initiatie tot het in werking gaan van het contract.

### Persoonlijke informatie (5 min)

- Wat houdt je huidige functie in?
- Vanaf wanneer heeft u deze functie?
- Vanaf wanneer bent u werkzaam binnen uw huidige werkgever?
- Heb je hiervoor bij een andere werkgever gewerkt? Zo ja, hoelang en welk type?

### Q-sort (25 min)

- Introductie Q-test
  - o Het sorteren van stellingen van mee oneens tot eens, antwoordend op een hoofdvraag.
  - o Verschil met standaard vragenlijst.
- Test

- Waarom heeft u voor deze stelling gekozen als meest mee eens? (*Vraag dit voor de 3 hoogst gescoorde stellingen*)
- Waarom heeft u voor deze stelling gekozen als meest mee oneens? (*Vraag dit voor de 3 hoogst gescoorde stellingen*)

#### **Precontractuele/Initiatief fase (15 min) (Alleen OG)**

- Wat zijn voor u belangrijke factoren bij het bepalen van een contract strategie?
- Houdt u daarbij rekening met de kans op conflicten? En zo ja, hoe?
- Vanaf welk moment is het proces wordt er nagedacht over de contractvorm en proces?

#### **Aanbesteding**

- Hoe ervaart u nu de verhouding tussen ON en OG tijdens de aanbesteding?
- Welke aspecten binnen uw laatst geparticipeerde aanbesteding bevorderde de samenwerking tussen ON en OG?
- En welke absoluut niet?
- Wat zou u zelf aan de aanbesteding willen veranderen om conflicten te voorkomen tijdens de uitvoering?
- Past u, als ON, de inschrijving aan n.a.v. de uitvraag? Wanneer er bijvoorbeeld extra prikkels/stimulansen instaan of inspanningsverplichtingen?

#### **Afsluiting**

- Bedankt voor uw medewerking
- Resultaten onderzoek
- Wilt u op de hoogte worden gehouden over het verloop van mijn onderzoek?

# Appendix C

Overview characteristics of the interviewed professionals.

Characteristic	Amount
Total amount	31
Total amount involved in analysis	30*
<b>Role during projects**</b>	
Client	10
Contractor	10
Consultant	10
<b>Amount different organisations per type</b>	
Client	7***
Contractor	8***
Consultant	1
<b>Amount of organisation types per role</b>	
Client	5
Contractor	3
Consultant	1

\* One person working as consultant is excluded of the analysis, because his experience in projects was mainly abroad (FITTIK contracts).

\*\* Only the characteristics of the involved interviewees are figured in this table.

\*\*\* **Client:** 3 different municipalities, 1 Province, Rijkswaterstaat, 1 Seaport and 1 District waterboard

**Contractor:** 6 different national operating contractors, 1 engineering company acting as contractor in multiple infrastructure projects, 1 regional operating contractor

\*\*\*\* **Client:** Municipality, Province, Seaport, District waterboard and Rijkswaterstaat

**Contractor:** National operating contractor, regional operating contractor and engineering company.

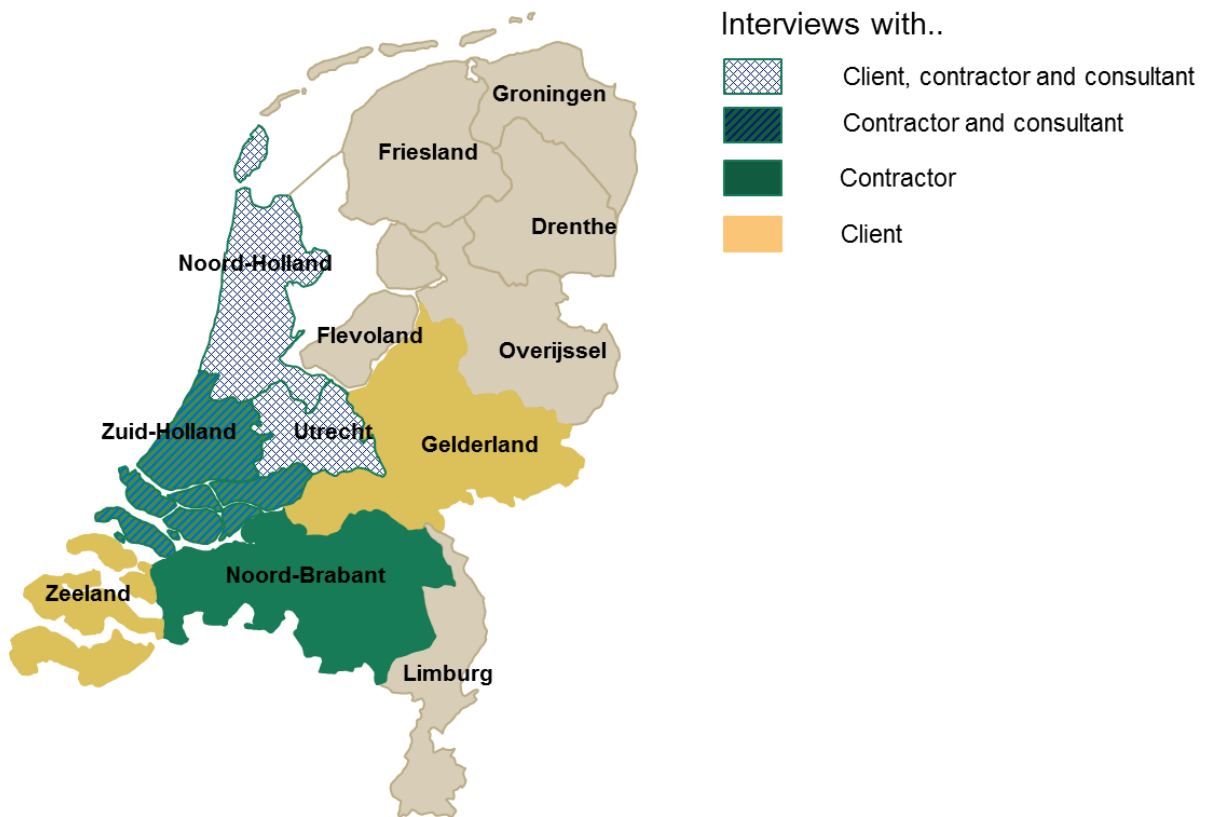


Figure 51: Locations interviews



# Appendix D

## Factor A 'Unpredictability and uncertainty'

Nr.	Statement	Score	Note
29	Distrust and lack of team spirit	5	
22	Unforeseen contingencies	4	High
21	Changing requirements	4	High
25	Interpretation and ambiguities in contract terms	3	High
23	Responsibility risks	3	High
8	Opportunistic behaviour	3	
5	Availability information	2	High
19	Contradictory and error of information in mass of documents	2	
28	Impact changes	2	
7	Postpone (part of) the project	1	
24	Lack of contractual details	1	
11	Lack of communication	1	Low
32	Insufficient knowledge of each other's interests	1	Low
1	Unrealistic expectations	0	
12	Quality of technical specification	0	High
6	Delay by other contractors employed by the client	0	
20	Measurement and valuation contracted work	0	
30	Communication patterns	0	Low
27	Problems with local stakeholders	0	
16	Supervision and coordination contractor	-1	Low
17	Failure to plan and execute the changes of works	-1	
31	Political influences	-1	
14	Liquidated damages	-1	Low
10	Quality of design	-2	Low
9	Ambiguous roles and interface problem	-2	
15	Percentage change original design	-2	
2	Acceleration activities	-3	
4	Final certificate and payment	-3	
26	Individual's influence	-3	Low
13	Outstanding payment	-4	
18	Adversarial approach in handling disputes	-4	Low
3	Termination contract	-5	Low

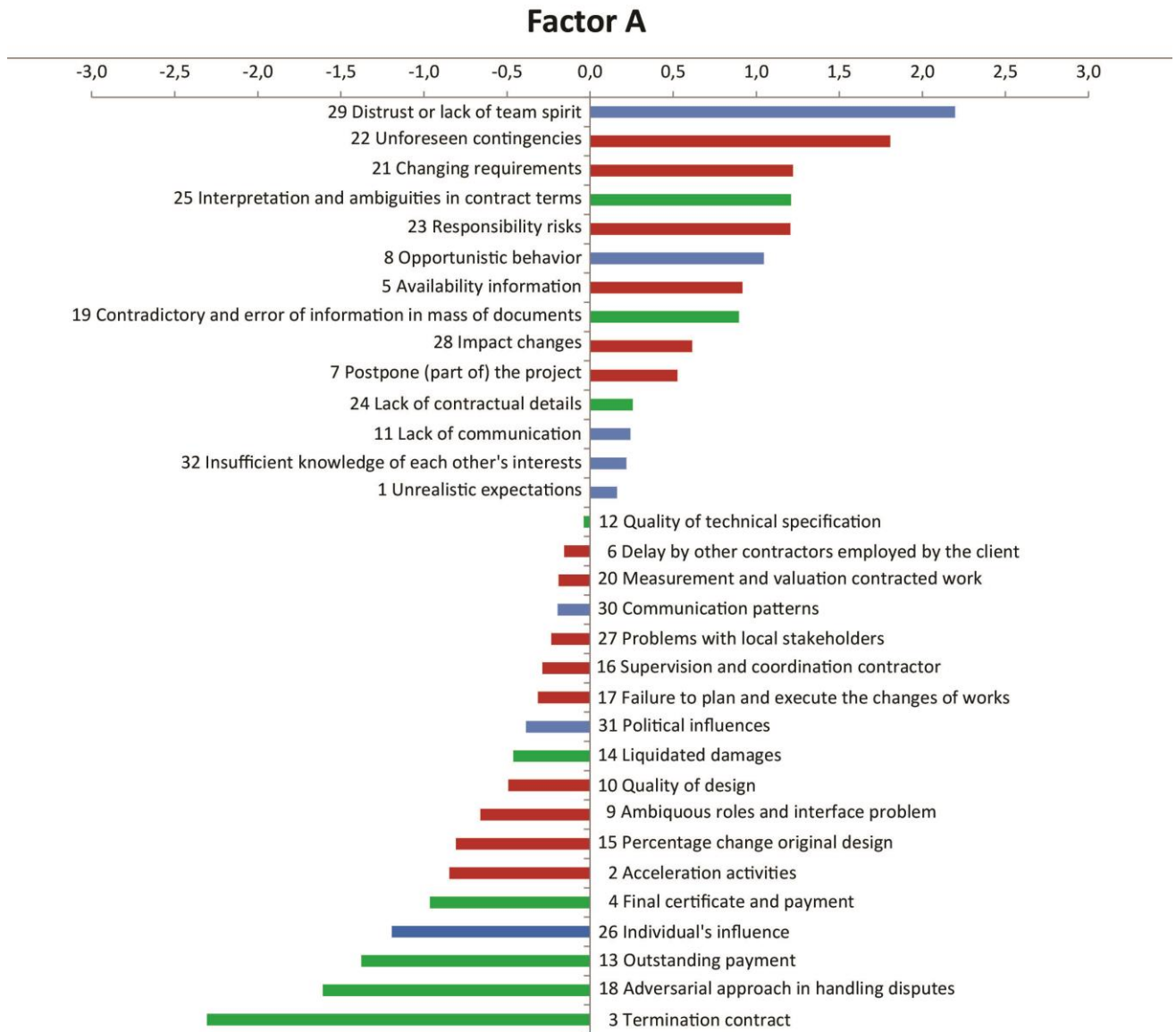


Figure 52: Factor 'unpredictability and uncertainty'

## Factor B

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Nr.	Statement	Score	Note
29	Distrust and lack of team spirit	5	
32	Insufficient knowledge of each other's interests	4	
8	Opportunistic behaviour	4	High
26	Individual's influence	3	High
30	Communication patterns	3	High
1	Unrealistic expectations	3	High
11	Lack of communication	2	
28	Impact changes	2	
9	Ambiguous roles and interface problem	2	High
7	Postpone (part of) the project	1	
16	Supervision and coordination contractor	1	
23	Responsibility risks	1	
25	Interpretation and ambiguities in contract terms	1	
10	Quality of design	0	
17	Failure to plan and execute the changes of works	0	
14	Liquidated damages	0	
4	Final certificate and payment	0	High
20	Measurement and valuation contracted work	0	
15	Percentage change original design	0	
31	Political influences	-1	
3	Termination contract	-1	High
27	Problems with local stakeholders	-1	
22	Unforeseen contingencies	-1	
13	Outstanding payment	-2	High
12	Quality of technical specification	-2	
21	Changing requirements	-2	
2	Acceleration activities	-3	
18	Adversarial approach in handling disputes	-3	
24	Lack of contractual details	-3	Low
5	Availability information	-4	Low
6	Delay by other contractors employed by the client	-4	Low
19	Contradictory and error of information in mass of documents	-5	Low

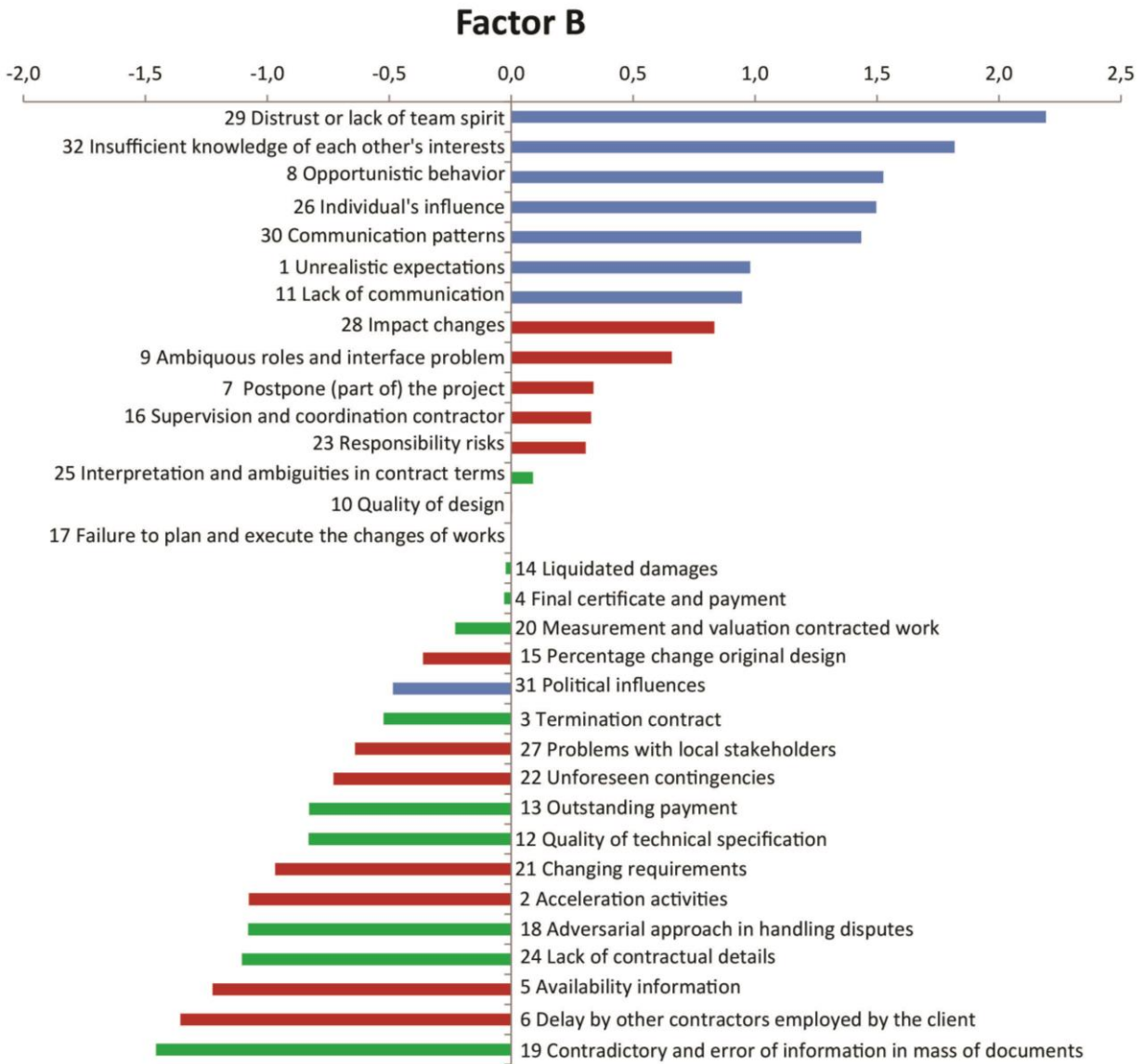


Figure 53: Factor 'human and behaviour'

## Factor C

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Nr.	Statement	Score	Note
10	Quality of design	5	High
11	Lack of communication	4	
32	Insufficient knowledge of each other's interests	4	
19	Contradictory and error of information in mass of documents	3	
16	Supervision and coordination contractor	3	High
29	Distrust or lack of team spirit	3	Low
27	Problems with local stakeholders	2	High
20	Measurement and valuation contracted work	2	High
24	Lack of contractual details	2	High
30	Communication patterns	1	
28	Impact changes	1	
6	Delay by other contractors employed by the client	1	
14	Liquidated damages	1	
23	Responsibility risks	0	
5	Availability information	0	
8	Opportunistic behaviour	0	Low
18	Adversarial approach in handling disputes	0	High
17	Failure to plan and execute the changes of works	0	
31	Political influences	0	
25	Interpretation and ambiguities in contract terms	-1	Low
15	Percentage change original design	-1	
26	Individual's influence	-1	
9	Ambiguous roles and interface problem	-1	
1	Unrealistic expectations	-2	Low
7	Postpone (part of) the project	-2	Low
21	Changing requirements	-2	
4	Final certificate and payment	-3	
3	Termination contract	-3	
12	Quality of technical specification	-3	
22	Unforeseen contingencies	-4	Low
2	Acceleration activities	-4	
13	Outstanding payment	-5	

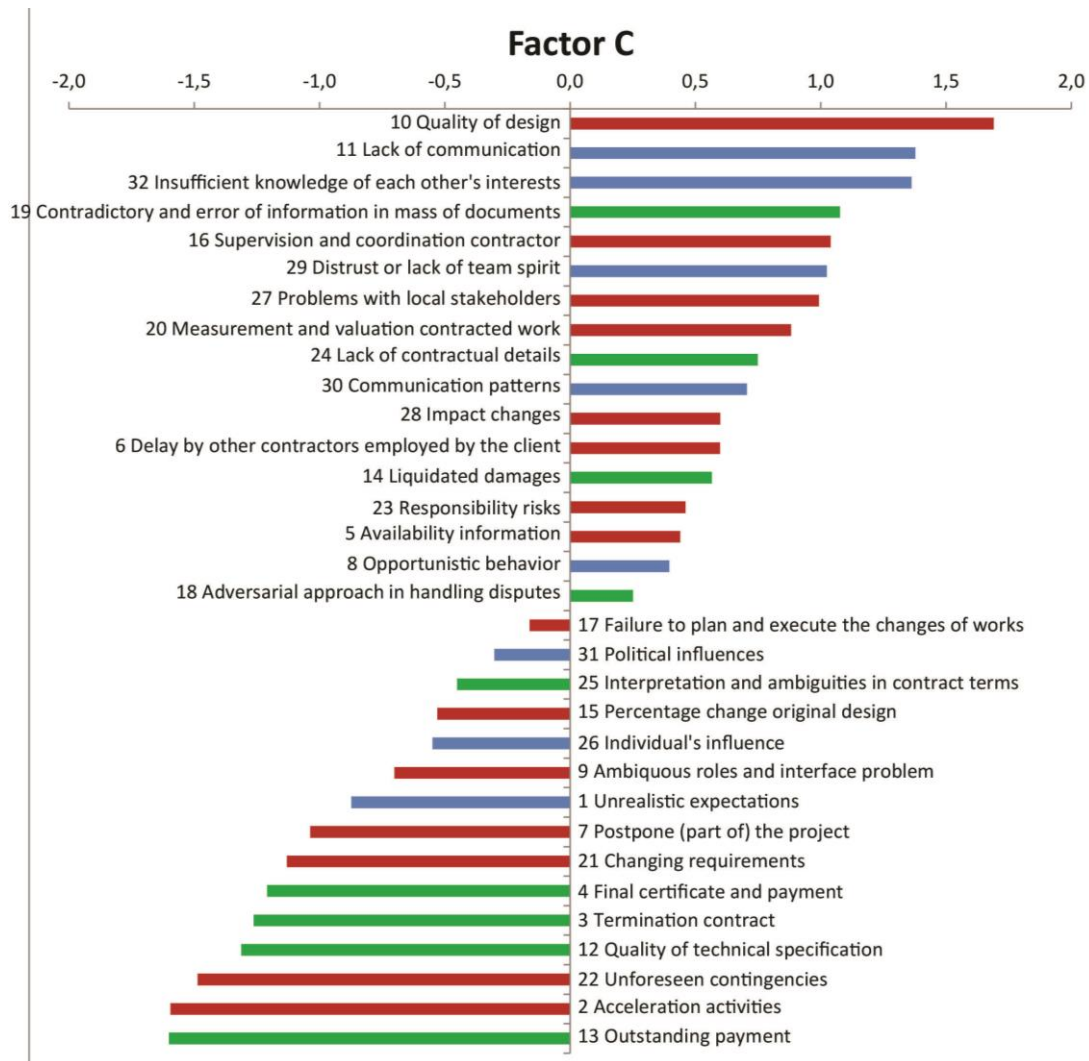


Figure 54: Factor 'Lack of clarity and competence'

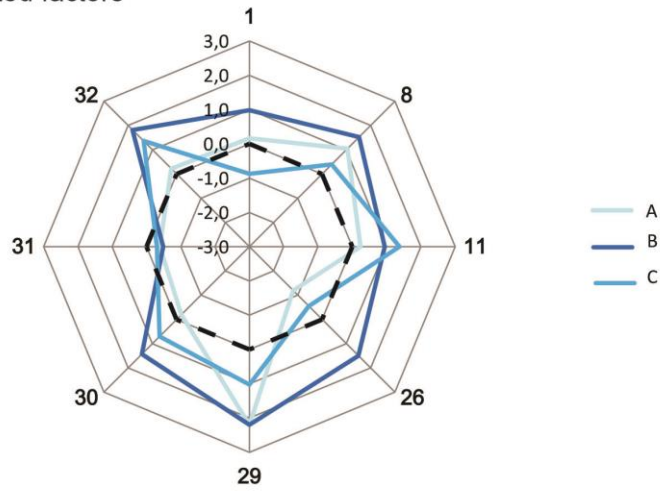
# Appendix E

## Scores process, project and contract related causes

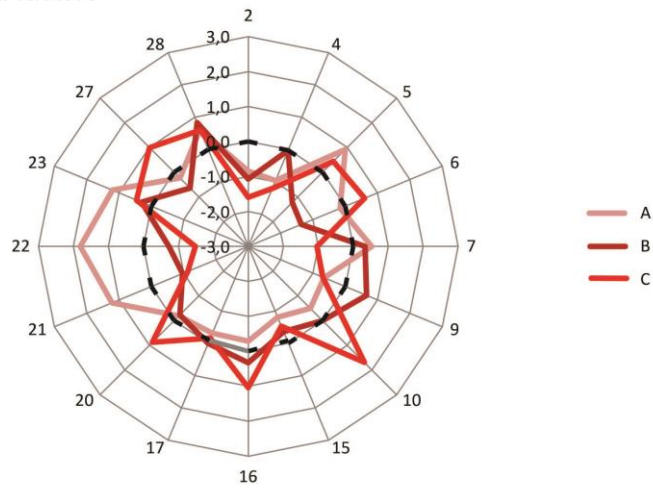
Figure 55 pictured the scores on the project, process and contract related causes individually. This gives an insight into the assigned importance by the different factors of the several types of causes. The dotted black line represents the 0-line, which corresponds with a neutral score. Neutral does not mean the particular cause is not identified as conflict cause, but that the particular cause is not a dominating cause for conflicts. Only a high negative value, closer to the center of the radar figures, indicates a cause does not or minor contribute to conflicts.

In general the process related causes score higher than the project- and contract related causes. The project related causes include more variety and score alternating positively and negatively. The contract related causes include more negative scores, but the scores of the factors 'unpredictability and uncertainty' and 'lack of clarity and competence' assign a few contract related causes with positive or even extreme positive scores for cause 19 and 25.

process related factors



project related factors



contract related factors

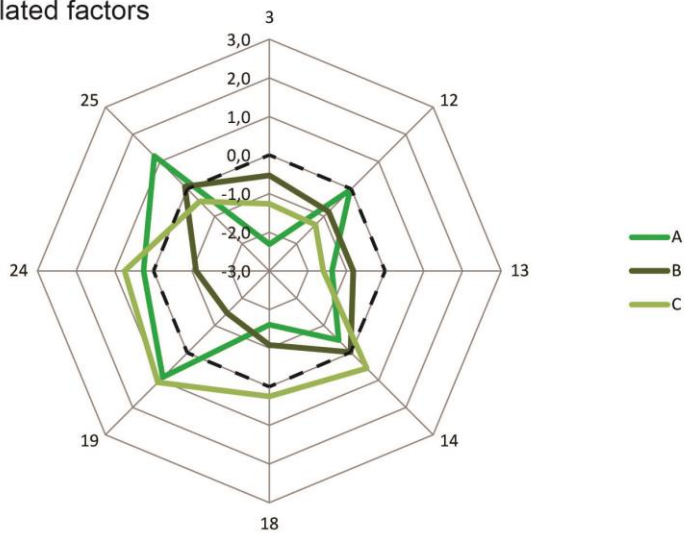


Figure 55: Scores process, project and contract related causes



# Appendix F

This table summarized the given answers by the respondents to the question: Which element during the procurement phase positively influences the conflict prevention during the contractual phase.

**Table 17: Experienced procurement preferences**

	Client	Contractor	Consultant	Total amount	Literature
Dialogues	I	II	III	6	Ja d, e
Reasonable risk distribution		I	I	2	Ja g
Familiarity with each other in an early stage	II	I	III	6	Ja c, h, I
Restricted procedure	I		I	2	Ja L
Verification requirements and design	I		I	2	
Selection on experience, quality	III	I		4	Kind of I
Past performance	I			1	
Client should get his content right	I			1	Ja g
Sharing risk register	I			1	Ja e
Precise answering and questing during 'Nota van	I			1	

inlichtingen'			
Notifications on the project site	I		I
To think along with the client on project and process problems	I		I
Consistency teams procurement and contractual phase	III		3

The second table consists of the suggested procurement activities which hampers the conflict prevention.

	Client	Contractor	Consultant	Total amount
Transmitting large amount of information			I	1
One way communication			I	1
Over request on references		I	I	2
Every insufficient organized aspect, could lead to conflicts	I			1
Not respecting each other's interest	I			1
Procurement law (flexibility)	I			1

Unreasonable risk distribution	I	III	4
No personal communication		I	1
Difference between tender manager and project manager		I	1

The third table pictured the answers to the question: What would you change in the current procurement practices to prevent future conflicts?

**Table 18: Preferred changes procurement**

	Client	Contractor	Consultant	Total amount	Literature
Alliance		I	II	3	
Alignment of contract type and project type			I	1	
Market consultations			II	2	
Incorporating stakeholders, expectations and communication in the pre-contractual phase			I	1	
Selection teams (reciprocal)			I	1	
Procurement with small amount of	I		I	2	

contractors				
Dialogues (also smaller projects)	III	I	I	5
Discussion between award and tender	I			1
Change procurement law	III			3
Political expectations, no BAHAMA model	I			1
Past performance as selection criteria	I			1
Clarity tender	I			1
Include final valuation in tender	I			1
Reasonable risk distribution		II		2
Client should get preparation right		I		1
Highlight the most important interests in the tender			I	1

# Appendix G

## Formulier waarnemers

Als waarnemers hebben jullie een cruciale rol tijdens de sessies. Jullie zijn verantwoordelijk voor het waarnemen van de onderhandelingstactieken van de spelers. Daarnaast is het belangrijk om hun stappen in kaart te brengen. Om het iets makkelijker te maken, is dit formulier opgesteld als hulpmiddel om de verschillende factoren te scoren. Probeer alles zo compleet mogelijk in te vullen en bespreek in de nabespreking mogelijke twijfels met de teams afzonderlijk. Het wordt gewaardeerd om in 1 zin je antwoord toe te lichten.

### a. Case 1:

Naam waarnemer:		Team nummers:
Onderwerp	Criteria	Commentaar
1. <b>Kennis van elkaars belangen</b>	De partijen zijn bezig om te achterhalen wat het belang is van de andere partij bijvoorbeeld d.m.v. vragen stellen over planning en ontwerpfouten?	Team OG:  Team ON:
	Partijen doen aannames over belang andere partij. ( <i>tip: bespreek dit ook bij de nabespreking</i> )	Team OG:  Team ON:
2. <b>Uiteenlopende verwachtingen</b>	Partijen bespreken verwachtingen over de uitkomst van het overleg?	Team OG  Team ON
	Partijen bespreken verwachtingen over de oorzaak van de afkeuring van het ontwerp?	Team OG  Team ON
	Partijen spreken over verwachtingen verdere samenwerking?	Team OG  Team ON

<b>3.Stukgelopen communicatie</b>	Luisteren partijen naar elkaar? Worden er wedervragen gesteld of wordt er vooral met oplossingen gestrooid?	Team OG Team ON
	Wordt er gereageerd op elkaars inhoudelijke commentaar?	Team OG Team ON
	Wordt er gereageerd op elkaars emotionele commentaar?	Team OG Team ON
<b>4.Strategisch gedrag</b>	Wordt er vastgehouden aan stuurbedragen/eisen meegekregen vanuit hoger management?	Team OG Team ON
	Wordt er geprobeerd de andere partij in de hoek te zetten op een manier? ( <i>tip: bespreek dit in de nabespreking</i> )	Team OG Team ON
	<b>5.Wantrouwen</b>	Worden er veel controle vragen gesteld om te achterhalen om argumenten te controleren? Team OG Team ON
	Wordt er vaak gedacht: Hij zal wel dit of dat willen bereiken? ( <i>tip: bespreek dit tijdens de nabespreking</i> )	Team OG Team ON
	Wordt er vanuit de andere partij gepraat? <i>Voorbeelden:</i> <i>Je gaat vast dit zeggen...</i> <i>Pff, jij wilt zeker dat....</i> <i>Dan ga je ons zeker daar dwarszitten..</i>	Team OG Team ON
<b>6.Contract interpretatie</b>	De partijen tonen begrip voor de verschillende interpretatie van het contract?	Team OG Team ON

	Er wordt gesproken over de Team OG verschillende interpretatie van het eisen pakket	Team ON
	Er worden andere interpretatie fouten doorgesproken	Team OG  Team ON
<b>7.Conflict</b>	Komen de partijen er binnen de tijd op of moeten ze escaleren?	Ja of nee (doorstrepen wat van toepassing is)

**8.Overige  
opmerkingen**

**b. Case 2**

<b>Naam waarnemer:</b>	<b>Team nummers:</b>
<b>2a. Individuele ronde vooraf</b>	
<b>1. Kennis van elkaars belangen</b>	De partijen zijn bezig om te achterhalen wat het belang is van de andere partij d.m.v. vragen stellen over planning en ontwerpfouten? Team OG: Team ON:



	Partijen doen aannames over belang andere partij. ( <i>tip: bespreek dit ook bij de nabespreking</i> )	Team OG: Team ON:
<b>2.Verwachtingen</b>	Partijen bespreken verwachtingen over de uitkomst van het overleg?	Team OG: Team ON:
	Partijen spreken over verwachtingen verdere samenwerking?	Team OG: Team ON:
<b>3.Contract interpretatie</b>	Er wordt gesproken over de verschillende interpretatie van het eisen pakket	Team OG: Team ON:
	Er worden andere interpretatie fouten doorgesproken	Team OG: Team ON:
<b>2b: Contractonderhandling</b>		
<b>Onderwerp</b>	<b>Criteria</b>	<b>Commentaar</b>
<b>1. Kennis van elkaars belangen</b>	De partijen zijn bezig om te achterhalen wat het belang is van de andere partij d.m.v. vragen stellen over planning en ontwerpfouten?	Team OG: Team ON:
	Partijen doen aannames over belang andere partij. ( <i>tip: bespreek dit ook bij de nabespreking</i> )	Team OG: Team ON:
<b>2.Uiteenlopende verwachtingen</b>	Partijen bespreken verwachtingen over de uitkomst van het overleg?	Team OG Team ON

	Partijen bespreken verwachtingen over de oorzaak van de afkeuring van het ontwerp?	Team OG Team ON
	Partijen spreken over verwachtingen verdere samenwerking?	Team OG Team ON
<b>3.Stukgelopen communicatie</b>	Luisteren partijen naar elkaar? Worden er wedervragen gesteld of wordt er vooral met oplossingen gestrooid?	Team OG Team ON
	Wordt er gereageerd op elkaars inhoudelijke commentaar?	Team OG Team ON
	Wordt er gereageerd op elkaars emotionele commentaar?	Team OG Team ON
<b>4.Strategisch gedrag</b>	Wordt er vastgehouden aan stuurbedragen meegekregen vanuit hoger management?	Team OG Team ON
	Wordt er geprobeerd de andere partij in de hoek te zetten op een manier? <i>(tip bespreek dit in de nabespreking)</i>	Team OG Team ON
<b>5.Wantrouwen</b>	Worden er veel controle vragen gesteld om te achterhalen om argumenten te controleren?	Team OG Team ON
	Wordt er vaak gedacht: Hij zal wel dit	Team OG

	of dat willen bereiken? ( <i>tip: bespreek dit tijdens de nabespreking</i> )	Team ON
	Wordt er vanuit de andere partij gepraat? <i>Voorbeelden:</i> <i>Je gaat vast dit zeggen...</i> <i>Pff, jij wilt zeker dat...</i> <i>Dan ga je ons zeker daar dwarszitten..</i>	Team OG    Team ON
<b>6.Contract interpretatie</b>	Tonen de partijen begrip voor de verschillende interpretatie van het contract?	Team OG   Team ON
	Er wordt gesproken over de verschillende interpretatie van het eisen pakket	Team OG  Team ON
	Er worden andere interpretatie fouten doorgesproken	Team OG  Team ON
<b>7.Conflict</b>	Komen de partijen er binnen de tijd op of moeten ze escaleren	Ja of nee (doorstrepen wat van toepassing is)

**8.Overige  
opmerkingen**

# 1. Case 1 omschrijving

De volgende omschrijving zal alleen te lezen zijn voor de teams die de opdrachtgever en respectievelijk de opdrachtnemer vertegenwoordigen.

---

## **Opdrachtgever:**

De opdrachtnemer is nu 6 maanden bezig aan het ontwerp van een kruispunt na een afrit van een snelweg. Het komt niet overeen met de afspraken, die jullie hebben gemaakt met de fietsbond. Er moet namelijk een fietsverbinding blijven, die stad A met stad B verbindt met zo min mogelijk overbodige kilometers. Deze afspraak staat op de volgende manier in het contract:

Eis 341: De huidige fietsverbinding van A naar B, moet zo rechtlijnig mogelijk zijn met weinig omleidingen en stoplichten.

Doordat de opdrachtnemer nu meer tijd moet besteden aan het ontwerp, zal de uitvoering later starten. Jullie verwachten veel drukte van auto's en fietsers begin september ivm einde vakantie. Nu ziet het ernaar uit dat de bouw begint tegelijk met deze drukte, dat zal veel hinder en vertragingen veroorzaken.

Verder is er niet veel budget meer over om mee te geven en heb je van je leidinggevende mee gekregen dat het vooral belangrijk is dat het contact met de fietsbond goed blijft en dat hinder moet worden vermeden. Het mag maximaal 20.000 extra kosten. De planning is ook vrij cruciaal, want eventuele opbrekingen mogen niet tegelijk beginnen met de topdrukke begin september. Eventuele verkeersmaatregelen mogen van het VCP (verkeers coördinatiepunt).

Aan jullie de taak om de contractonderhandeling uit te komen met:

- Een planning die overeen komt met de eisen van het VCP
  - Geen extra kosten, desnoods 20.000, maar echt als uiterste
- 

## **Opdrachtnemer:**

Jullie zijn inmiddels 6 maanden hard bezig met het ontwerp van een kruispunt. Het is best een complex kruispunt. Vorige maand moest er een verandering in het ontwerp komen door een gasleiding, die niet op eerdere tekeningen te vinden was. Voor de ontwerpfase stond 600.000 begroot, maar is inmiddels opgelopen tot 750.000. Daarnaast is nu jullie ontwerp afgekeurd, maar jullie hebben geen idee waarom. Jullie vinden dat het deels aan jullie zelf ligt, maar dat de opdrachtgever hier ook wat van moet betalen, omdat zij niet de juiste informatie hebben geleverd. Daarom gaan jullie aankondigen dat jullie een schade vergoeding willen van 80.000 euro.

Jullie weten wel dat de opdrachtgever afspraken heeft met omwonende en jullie gebruik maken van zware machines om het huidige ontwerp te realiseren, dat kan inderdaad voor veel geluidsoverlast zorgen. Dit stond niet in een eistekst geformuleerd, maar jullie willen best beperken door deze machines niet 's nachts te gebruiken. Ook om de opdrachtgever iets mee te geven tijdens de onderhandeling.

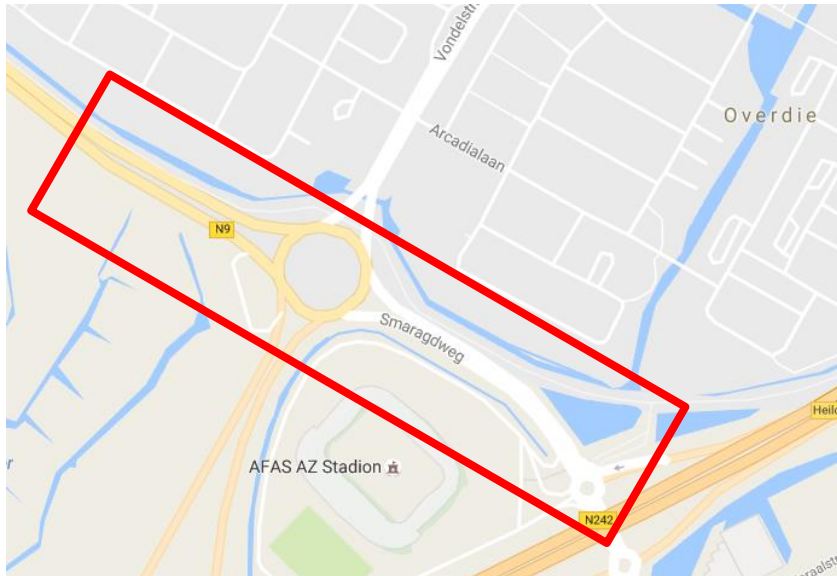
Aan jullie de taak om de contractonderhandeling uit te komen met:

- Een goed gekeurd ontwerp
  - Een compensatie van 80.000, desnoods neemt jullie leidinggevende genoeg met 65.000 euro.
-

## 2. Case 2 omschrijving

### a. TenderNed aankondiging

Aankondiging opdracht: D&C Wegendeel N9 inclusief rotonde



### b. Omschrijving individuele dialoog

De volgende omschrijving zal alleen te lezen zijn voor de teams die de opdrachtgever en respectievelijk de opdrachtnemer vertegenwoordigen. De uitkomst van de onderstaande bespreking zal openbaar worden gemaakt, mochten er uitspraken worden gedaan die een wijziging van eistekst betekenen.

---

#### Opdrachtgever

De N9 is voor jullie een belangrijke verbindingsweg naar de A9, N242 en niet onbelangrijk naar het AZ stadion. Er staat echter vaak file en jullie willen dit knooppunt verbeteren. Belangrijkste eis is om de verbinding tussen de verschillende wegen te optimaliseren. Verder moet het stadion in het weekend via de rotonde naar de N242 bereikbaar blijven, maar mag er doordeweeks van een andere ontsluitingsroute gebruik gemaakt worden. Er is door jullie vooronderzoek gedaan naar de bodem op verschillende plekken; bij de rotonde N242, N9 en vlak voor de ontsluiting naar het stadion. De ondergrond is overal hetzelfde; erg zachte klei. Jullie doel van de voorbespreking is om de volgende zaken af te stemmen:

1. **Planning:** Ontwerpfase zal in januari moeten starten, zodat in maart kan worden begonnen met de uitvoering. De opdrachtnemer heeft dus 2 maanden ontwerptijd. Tijdens juli en augustus mag de verkeershinder het grootst zijn, met uitzondering van 1 tot 10 juli ivm begin vakantie en verwachte verkeersdrukke. De oplevering moet voor 1 september zijn, want dan begint de topdrukke weer tussen de A9 en de N242.

2. **Kosten:** Jullie mogen hier niet teveel over loslaten, maar door het groot aantal werken inclusief juridische procedures hebben jullie geen ruimte voor veel meerwerk naderhand. In totaal hebben jullie 14 miljoen voor het hele project inclusief eventueel meerwerk.
3. **Stakeholders:** Er zijn eigenlijk 3 belangrijke stakeholders. De gemeente Alkmaar, Directie van het AZ stadion en de bewonersvereniging van de wijk Overdie. De gemeente Alkmaar houdt rekening met mogelijke uitbreiding van haar stad richting Heiloo. Daarom hebben zij een voorkeur voor een verlaagde rotonde of een ondergrondse rotonde. De directie van het AZ stadion vindt de ontsluiting naar hun stadion erg belangrijk en wilt geen last (te harde trillingen) van de werkzaamheden. Zij zijn bang voor schade aan hun stadion en voor file vorming bij druk bezochte wedstrijden. De woonvereniging wil de verbinding met de Vondelstraat intact laten en ziet wel wat in een extra ontsluiting vanuit hun wijk naar de rotonde rechtstreeks bij de N242. Verder willen zij goed geïnformeerd worden over eventueel hinder en alternatieve routes.

Jullie hebben een bonus clause in de uitvraag gedaan om de planning te bevorderen. Daarnaast hebben jullie een specificatie gedaan over de verbinding.

---

#### **Opdrachtnemer:**

Een project als de N9 kunnen jullie wel gebruiken in jullie projectportefeuille heb je gehoord van hoger management. Het is de bedoeling dat er een verbinding komt tussen de N9, N242 en het stadion van AZ, die zorgt voor een betere doorstroming tijdens piekbelastingen. Deze piekbelastingen zijn vooral tijdens spijtijden en wedstrijden van AZ. Jullie moeten in januari beginnen met ontwerpen, als de definitieve gunning naar jullie gaat. Vervolgens start de uitvoering in maart. Aan jullie de taak om eventuele risico's te identificeren, die achter dit project zouden kunnen schalen. Het project ziet er overzichtelijk uit, maar jullie willen de technische en proces risico's achterhalen. Voor jullie zijn veiligheid, risico en budget de belangrijkste zaken om te achterhalen.

1. **Veiligheid:** Veiligheid staat bij jullie al jaren op 1 en daar staan jullie bekend om. Jullie werknemers gaan alleen maar aan het werk bij goed afgezette wegen. Het zal dus onomkoopbaar zijn om de verbindingsweg naar de N242 af te sluiten gedurende het werk.
2. **Risico:** Jullie willen graag bodemonderzoek hebben van het gebied. Dit om te bepalen wat voor type oplossing haalbaar is. Jullie hebben dit echter nog niet gezien en zijn benieuwd wie hier verantwoordelijk voor is. Verder zijn jullie benieuwd naar de meningen van de stakeholders in de omgeving. Zit daar mogelijk hinder tijdens de uitvoeringsfase?
3. **Budget:** De opdracht is vrij open en jullie willen graag weten of meer waarde wordt gehecht aan een goedkope oplossing of een kwalitatieve oplossing, die iets meer tijd en dus geld gaat kosten. Bij dat laatste zal het betekenen dat jullie een maand extra ontwerptijd nodig hebben.

Doel van jullie is om wat ontwerpmogelijkheden te bespreken en een indicatie van de mogelijke risico's te krijgen.



## c. Case 2 interventie

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### Opdrachtgever

De opdrachtnemer is nu 1,5 maand bezig aan het ontwerp van de rotonde bij de N9. Het komt niet overeen met de afspraken, die jullie hebben gemaakt met de directie van het AZ stadion. De opdrachtnemer plaatst een extra oversteekplaats voor fietsers, dicht bij de auto ontsluiting naar het stadion. De directie is bang voor teveel opstoppingen bij piekdrukke tijdens wedstrijden.

Doordat de opdrachtnemer nu meer tijd moet besteden aan het ontwerp, zal de uitvoering later starten. Jullie verwachten veel drukte van auto's en fietsers begin september ivm einde vakantie, daarom hebben jullie een bonusregeling voorgesteld. Nu ziet het ernaar uit dat de bouw begint tegelijk met deze drukte, dat zal veel hinder en vertragingen veroorzaken.

Verder is er niet veel budget meer over om mee te geven en heb je van je leidinggevende mee gekregen dat het vooral belangrijk is dat het contact met de de directie van het AZ stadion goed blijft en dat hinder moet worden vermeden. Het mag maximaal 20.000 extra kosten. De planning is ook vrij cruciaal, want eventuele opbrekingen mogen niet tegelijk beginnen met de topdrukke begin september. Eventuele verkeersmaatregelen mogen van het VCP (verkeers coördinatiepunt).

Aan jullie de taak om de contractonderhandeling uit te komen met:

- Een planning die overeen komt met de eisen van het VCP
- Geen extra kosten, desnoods 10.000, maar echt als uiterste

---

### Opdrachtnemer:

Jullie zijn 1,5 maand hard bezig met het ontwerp van de twee kruispunten en de verbindingswegen. Het is best een complex kruispunt is gebleken inclusief veel eisen van stakeholders betreffende de ontsluiting na de wijk Overdie, stadion en N242/N9. Vorige week moest er een verandering in het ontwerp komen door bodemgegevens, die niet op eerdere onderzoeken zichtbaar was. Voor de ontwerpfase stond 200.000 begroot, maar is opgelopen tot 250.000. Jullie vinden dat het deels aan jullie zelf ligt, maar dat de opdrachtgever hier ook wat van moet betalen, omdat zij niet de juiste informatie hebben geleverd. Daarom gaan jullie aankondigen dat jullie een schade vergoeding willen van 30.000 euro. Mochten jullie terug naar de tekentafel worden gestuurd door schuld van de OG, dan willen jullie daar bovenop een vergoeding van 15.000 voor het missen van de bonusregeling.

Jullie weten wel dat de opdrachtgever afspraken heeft met de bewonersvereniging Overdie en jullie gebruik maken van zware machines om het huidige ontwerp te realiseren, dat kan inderdaad voor veel geluidsoverlast zorgen. Dit stond niet in een eistekst geformuleerd, maar jullie willen best beperken door deze machines niet 's nachts te gebruiken. Ook om de opdrachtgever iets mee te geven tijdens de onderhandeling.

Aan jullie de taak om de contractonderhandeling uit te komen met:

- Een goed gekeurd ontwerp
- Een compensatie van 30.000 en van 45.000 als jullie het ontwerp moeten aanpassen. Jullie manager neemt desnoods genoeg met 25.000 zonder extra ontwerpeisen en 35.000 met nieuwe ontwerpeisen.

# Appendix H

## Results questionnaire consultants

A questionnaire was used as input for a meeting on the results of my research. They acknowledged the conflict causes as root-causes of conflicts. Also the need for openness during dialogues is stipulated by them, if it is used for conflict prevention.

### Oorzaken conflicten

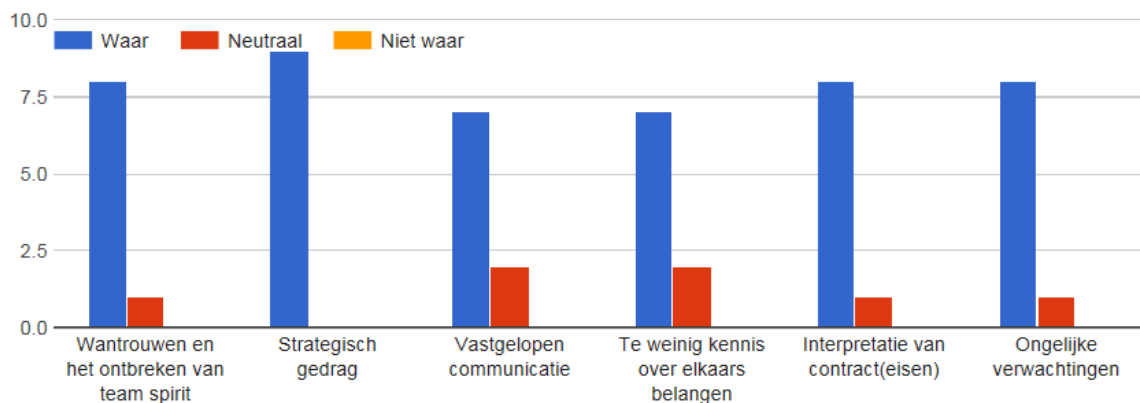


Figure 57: Validation conflict causes

### Dialogen

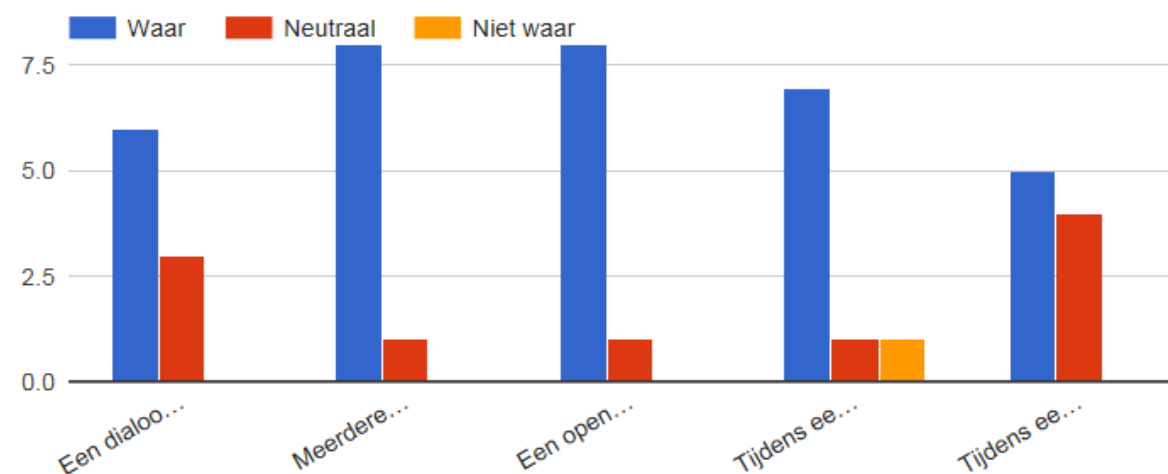


Figure 56: Validation dialogue

As the questions are not clear in above figure, the questions are given in next summation.

1. Een dialoog draagt bij aan conflict preventie (*A Dialogue contributes to conflict prevention*)
2. Meerdere dialogen zijn nuttig bij complexere projecten (*Multiple dialogues are needed when the complexity of projects is higher*)
3. Een open houding tijdens een dialoog is vereist om project inhoud te kunnen bespreken (*An open attitude during the dialogue is needed to discuss project content*)
4. Tijdens een dialoog worden verwachtingen besproken (*During dialogues expectations are discussed*)
5. Tijdens een dialoog worden contract interpretaties afgestemd (*During dialogues contract interpretations are discussed*)

