GUIDELINES FOR INCORPORATING MUTUAL TRUST BETWEEN CLIENT AND CONTRACTOR IN INTEGRATED CONTRACTS

A study towards the concept of trust in complex construction projects in the Netherlands governed by integrated contracts.

Graduation thesis

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Preface

This thesis is the cornerstone of my Master Construction Management and Engineering at the Eindhoven University of Technology. The thesis describes the research that was conducted into the concept of trust in the construction industry in the Netherlands. The research was conducted in full neutrality and with the help from experts from the industry.

This research aims at providing insight into the workings of mutual trust between client and contractor in complex building projects in the Netherlands, which are governed by an alliance contract or a New Engineering Contract. In addition, control mechanisms that can help develop or maintain a trust relationship between client and contractor will be discussed. Furthermore, this research aims to provide handles and guidelines regarding trust for future administrative conditions for integrated contracts. In doing so, the research contributes to the need from the industry for contracts with a bigger focus on cooperation rather than conflict.

The research can be relevant to clients, contractors and consultants that make use of integrated contracts. Also, the research can contribute to the development of the revised version of the Uniform Administrative Conditions for Integrated Contracts 2005, which is planned for 2018.

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Guidelines for incorporating mutual trust between client and contractor in integrated contracts

A study towards the concept of trust in complex construction projects in the Netherlands governed by integrated contracts.

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Abstract

The level of trust between client and contractor plays an important role in the realization of complex construction projects; the trust relationship between client and contractor can be supported by contracts and control mechanisms. There is a need from the construction industry for more support for the trust relationship between client and contractor in Dutch integrated contracts. It is found that the Uniform Administrative Conditions for Integrated Contracts 2005 do not suffice in this regard. This research examines the relation between the concept of trust, integrated contracts and control mechanisms in complex construction projects in the Netherlands.

This exploratory and qualitative research is conducted by applying three different research methods and comparing their results: a literature review, a Delphi study with an expert panel of 18 experts from the industry and in-depth interviews with five experts on integrated contracts in general and NEC3 or alliance contracts. This research focuses on the NEC3 and alliance contracts to find the advantages they provide regarding trust. Furthermore, this research considers formal and informal control mechanisms to find the most beneficial mechanisms to use in future complex construction projects.

This research shows that a high level of trust between client and contractor is beneficial to a complex construction project governed by an integrated contract; a high level of trust reduces conflicts and costs, improves quality and motivates communication and overall cooperation. It is found that a combination of an explicit mention of trust in a contract clause, formal control mechanisms, financial incentives and informal control mechanisms is required to incorporate trust in integrated contracts. The contract clause can align interests and motivates trust building; the informal control mechanisms (project start up, code of conduct) can be used to form the basis for the trust relationship and formal control mechanisms (open book accounting, early warning system, adjudication) are needed for comfort and safety of the stakeholders.

Keywords: trust, integrated contract, NEC3, NEC3-ECC, alliance, alliance contract, control mechanisms, formal control, informal control, Delphi.

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Summary

Although the concept of trust has been researched in many studies, the influence of trust and the processes regarding trust building in the construction industry are not yet researched to the full extent. Preliminary research showed that the level of trust between client and contractor plays an important role in the realization of complex construction projects and that the trust relationship between client and contractor can be supported by contracts and control mechanisms. This research has shown that there is a need from the construction industry for more support for a trust relationship between client and contractor in Dutch integrated contracts. It is found that the Uniform Administrative Conditions for Integrated Contracts 2005 (UAC-IC 2005) do not suffice in this regard, because it is based on conflict rather than trust. According to experts, the UAC-IC 2005 leaves no room for flexible and ad-hoc solutions; it provides not enough incentives for cooperation and communication; and too many different procedures and combinations of procedures are possible, not benefitting the trust relationship between stakeholders. The aim of this graduation thesis is to examine how the concept of trust can be incorporated in integrated contracts for complex construction projects in the Netherlands. This research examines the relation between the concept of trust, integrated contracts and control mechanisms in complex construction projects in the Netherlands.

This is an exploratory and qualitative research at the interface of a variation of fields of research in the context of the construction industry: technical, social, psychological, philosophical and juridical. The research is conducted by applying three different research methods and comparing their results: a literature review, a Delphi study with an expert panel of 18 experts from the industry and in-depth interviews with five experts on integrated contracts. The literature review is focussed on the concept of trust, contracts and control mechanisms. The research focuses on the NEC3 and alliance contracts (AC) to find their advantages regarding trust, because these conditions already provide some focus on cooperation. Furthermore, this research considers formal and informal control mechanisms to find the most beneficial mechanisms to use in future construction projects. The main research question has been formulated as follows: How can mutual trust between client and contractor be incorporated in integrated contracts?

The literature review on the concept of trust has shown that the available definitions for trust are not sufficient for the construction industry. There are several important factors for trust that need to be covered by the definition: belief, decision, action, risk and benefits and it must cover both rational and psychological aspects. By means of the literature review, a new definition for trust has been formulated: Trust is the willingness of the trustor to risk vulnerability to the trustee, based on the expectation that the trustee will make decisions with

positive intentions, without being harmed in the process or the need to control the actions of the trustee. Furthermore, the literature review showed that the most important aspects of trust for the construction industry are informal and related to the personal connection between client and contractor. The level of trust can be influenced by using contracts and control mechanisms. The literature review on contracts, shows that the NEC3 contracts and AC consider trust between client and contractor implicitly and explicitly. The NEC3 uses a clause mentioning trust; this is useful to create a likeminded environment, align interests and motivate trust building processes. Both sets of conditions provide obligatory and optional clauses, provisions and control mechanisms that support trust building. By means of the literature review on control mechanisms, the most common control mechanisms have been identified. A distinction between formal and informal control mechanisms can be made. Formal control mechanisms are focused on cooperation and quality assurance and are usually written in the contract; informal control mechanisms do not have to be written in the contract per definition, they focus on communication and cooperation and getting to know each other.

The results of the literature review have been compared to the results from the interviews and the Delphi study. The interviews have been held with five experts that were involved with either the construction of the Isala Hospital, which was governed by an AC, or the construction of the International Criminal Court, which was governed by an NEC3 contract. The Delphi study was used to generate a consensus amongst 18 experts on integrated contracts in the construction industry. The Delphi method was used to assess the different aspects of trust and the influence of control mechanisms on the level of trust between client and contractor.

This research has shown that a high level of trust between client and contractor is beneficial to a complex construction project governed by an integrated contract: a high level of trust reduces conflicts and costs, improves quality and motivates communication and overall cooperation. By comparing the results of all three research methods, it was found that a combination of an explicit mention of trust in a contract clause, formal control mechanisms, financial incentives and informal control mechanisms is required to incorporate trust in integrated contracts. The contract clause can align interests and motivate trust building; the informal control mechanisms (project start up, code of conduct) can be used to form the basis for the trust relationship and formal control mechanisms (open book accounting, early warning system, adjudication) are needed for comfort and safety of the stakeholders.

The graduation thesis is composed of ten chapters, each of them dealing with different aspect of the research: Chapter 1 is introductory and describes the context of the research, relevance, research goals and the research questions. Chapter 2 describes the research design. In chapters

3, 4 and 5, the literature review is discussed. Each of the chapters covers a different topic for literature study: chapter 3 focuses on the concept of trust; chapter 4 investigates different sets of conditions and contracts; chapter 5 addresses control mechanisms that are used in the construction industry. Chapter 6 describes the interviews that have been held for this research. The chapter is subdivided into two parts: it provides an outline of the case projects and a summary of the interviews for each case project. Chapter 7 concentrates on the Delphi study. Conclusions are drawn in chapter 8. In chapter 9, the discussion for this research is presented. This chapter is divided into two parts: the scientific contribution and the limitations of the research. Recommendations for future research are provided in chapter 10.

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Samenvatting (Dutch)

Hoewel het concept vertrouwen in veel studies is onderzocht, zijn de invloed van vertrouwen op het bouwproces en het bouwen aan een vertrouwensband in de bouwindustrie niet volledig onderzocht. Voorbereidend onderzoek toonde aan dat het vertrouwen tussen opdrachtgever en aannemer een belangrijke rol speelt bij het succesvol realiseren van complexe bouwprojecten en dat de vertrouwensband tussen opdrachtgever en opdrachtnemer door contracten en controlemechanismen kan worden ondersteund en verstevigd. Dit onderzoek toont aan dat er behoefte is aan meer aandacht voor een vertrouwensband tussen opdrachtgever en opdrachtnemer in Nederlandse integrale contracten in de bouwwereld. Het is gebleken dat de Uniforme Administratieve Voorwaarden voor Geïntegreerde Contracten 2005 (UAV-GC 2005) in dit opzicht niet voldoende ondersteuning bieden, omdat het meer gebaseerd is op conflicten dan op wederzijds vertrouwen. Volgens deskundigen laten de UAV-GC 2005 niet genoeg ruimte voor flexibele, ad-hoc oplossingen; het biedt niet genoeg motivatie voor samenwerking en communicatie; en het omvat te veel verschillende of onduidelijke procedures en combinaties van procedures, die het vertrouwen niet positief beïnvloeden. Het doel van dit afstudeeronderzoek is te onderzoeken hoe het concept vertrouwen kan worden opgenomen in geïntegreerde contracten voor complexe bouwprojecten in Nederland. Dit onderzoek beschrijft de relatie tussen vertrouwen, geïntegreerde contracten en controlemechanismen in complexe bouwprojecten in de Nederland.

Dit is een verkennend en kwalitatief onderzoek op het snijvlak van meerdere onderzoeksgebieden in de context van de bouwindustrie: technisch, sociaal, psychologisch, filosofisch en juridisch. Het onderzoek is uitgevoerd door drie verschillende onderzoeksmethoden toe te passen en de resultaten te analyseren en vergelijken: een literatuurstudie, een Delphi-studie en diepgaande interviews. De literatuurstudie is gericht op het concept vertrouwen, contracten en op controlemechanismen. Het onderzoek richt zich op de NEC3 en alliantie contracten (AC) om daar de voordelen op het gebied van vertrouwen in te vinden, aangezien deze voorwaarden al een zekere focus hebben op samenwerking. Ook worden formele en informele controlemechanismen onderzocht, om de meest gunstige mechanismen te vinden die in toekomstige bouwprojecten een positieve bijdrage kunnen leveren aan de vertrouwensband tussen opdrachtgever en opdrachtnemer. De onderzoeksvraag is als volgt geformuleerd: Hoe kan wederzijds vertrouwen tussen opdrachtgever en opdrachtnemer in integrale contracten worden opgenomen?

De literatuurstudie in dit onderzoek over het concept vertrouwen heeft aangetoond dat de beschikbare definities voor vertrouwen niet voldoende zijn om te worden toegepast in de bouwsector. Dit onderzoek toont aan dat er verschillende belangrijke factoren voor vertrouwen

zijn, die moeten worden gedekt door de definitie: overtuiging, beslissing, actie, risico's en voordelen en rationele én psychologische aspecten. Met behulp van de literatuurstudie is een nieuwe definitie van vertrouwen geformuleerd: Vertrouwen is de bereidheid van partij A om kwetsbaarheid te riskeren ten opzichte van partij B, waarbij partij A ervan uit gaat dat partij B beslissingen neemt met goede bedoelingen, zonder dat partij A hier negatieve effecten van ondervindt of het handelen van partij B moet beheersen. Verder blijkt uit dit onderzoek dat de belangrijkste aspecten van vertrouwen voor de bouwsector gerelateerd zijn aan de persoonlijke relatie tussen opdrachtgever en opdrachtnemer, waarbij de nadruk ligt op de informele aspecten. Het niveau van vertrouwen kan beïnvloed worden door gebruik te maken van contracten en controlemechanismen. Uit de literatuurstudie over contracten blijkt dat de NEC3 en AC contracten zowel impliciet als expliciet het vertrouwen tussen opdrachtgever en opdrachtnemer beschouwen. De NEC3 maakt gebruik van een clausule waarin vertrouwen expliciet wordt vermeld. Dit helpt om een gelijkgestemde wederzijdse belangen te creëren en het bouwen aan vertrouwen te motiveren. Beide sets van voorwaarden bieden verplichte en optionele clausules en bepalingen en aanvullende controlemechanismen die vertrouwen ondersteunen. Met behulp van de literatuurstudie voor controlemechanismen zijn de meest voorkomende controlemechanismen geïdentificeerd. Er kan een onderscheid gemaakt worden tussen formele en informele controlemechanismen. Formele controlemechanismen zijn gericht op samenwerking en kwaliteitsborging en worden vaak in het contract beschreven; informele controlemechanismen hoeven niet per definitie in het contract te staan, deze mechanismen richten zich op communicatie en samenwerking en elkaar leren kennen.

De resultaten van de literatuurstudie zijn vergeleken met de resultaten van de interviews en de Delphi-studie. De interviews zijn gehouden met vijf deskundigen die betrokken waren bij ofwel de bouw van het Isala Ziekenhuis, dat gebouwd werd met een AC, of de bouw van het Internationaal Strafhof, welke door een NEC3-contract werd ondersteund. De Delphi-studie is gebruikt om een consensus te vinden onder 18 deskundigen op het gebied van geïntegreerde contracten in de bouwsector. De Delphi-methode is ook gebruikt om de verschillende aspecten van vertrouwen en de invloed van controlemechanismen op het niveau van vertrouwen tussen opdrachtgever en opdrachtnemer te beoordelen.

Dit onderzoek toont aan dat een hoog niveau van vertrouwen tussen opdrachtgever en opdrachtnemer positief is voor een complex bouwproject met een geïntegreerd contract: een hoog niveau van vertrouwen vermindert conflicten en kosten, verbetert en motiveert de kwaliteit, communicatie en de algehele samenwerking in het project. Door het vergelijken van de resultaten van alle drie de onderzoeksmethoden blijkt dat een combinatie van maatregelen noodzakelijk is voor het stimuleren van wederzijds vertrouwen tussen opdrachtgever en

opdrachtnemer. Een expliciete vermelding van vertrouwen in een contractclausule, formele controlemechanismen, financiële prikkels en informele controlemechanismen nodig zijn om vertrouwen in geïntegreerde contracten op te nemen. De contractclausule kan zorgen dat gezamenlijke belangen worden uitgelijnd en het bouwen aan vertrouwen wordt gestimuleerd; De informele controlemechanismen (project start up, gedragscode) kunnen worden gebruikt als basis voor de vertrouwensband en formele controlemechanismen (open boekhouding, vroegtijdige waarschuwingssysteem, beoordeling) zijn nodig voor het comfort en gevoel van veiligheid van de stakeholders.

De afstudeerscriptie bestaat uit tien hoofdstukken, elk met een ander deel van het onderzoek. Hoofdstuk 1 is inleidend en beschrijft de context van het onderzoek, de relevantie, de onderzoeksdoelen en de onderzoeksvragen. Hoofdstuk 2 beschrijft het ontwerp van het onderzoek. In de hoofdstukken 3, 4 en 5 wordt de literatuurstudie besproken. Elk van de hoofdstukken behandelt een ander onderwerp voor literatuurstudie: hoofdstuk 3 richt zich op het concept vertrouwen; hoofdstuk 4 onderzoekt verschillende contractuele voorwaarden en contracten; hoofdstuk 5 behandelt controlemechanismen die in de bouwsector worden gebruikt. Hoofdstuk 6 beschrijft de interviews die voor dit onderzoek zijn gehouden. Het hoofdstuk is onderverdeeld in twee delen: het geeft een overzicht van de projecten en een samenvatting van de interviews voor elk project. Hoofdstuk 7 concentreert zich op de Delphi-studie. Conclusies worden getrokken in hoofdstuk 8. In hoofdstuk 9 wordt de discussie voor dit onderzoek gepresenteerd. Dit hoofdstuk is onderverdeeld in twee delen: de wetenschappelijke bijdrage van het onderzoek en de beperkingen van het onderzoek. Aanbevelingen voor toekomstig onderzoek vindt u in hoofdstuk 10.

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1. Introduction

1.1 Context

The level of trust between client and contractor plays an important role in the realization of complex construction projects and the trust relationship between client and contractor can be supported by contracts and control mechanisms. This research examines the relation between the concept of trust, integrated contracts and control mechanisms in complex construction projects in the Netherlands.

In the last few decades, the construction industry prefers the use of integrated contracts over traditional contracts to govern complex construction projects (Van Wassenaer, Thomas, & Van Geen, 2007). The Dutch Uniform Administrative Conditions for Integrated Contracts (UAC-IC 2005) are often applied to complex construction projects in which multiple companies work together to achieve project success (De Ridder, 2011). Trust is considered to be important for project success, because it affects communication and cooperation between parties (Azim et al., 2010; Monteiro de Carvalho & Rabechini Junior, 2015). However, preliminary research showed that not much is recorded about the effects of trust on integrated contracts, although this can be an important aspect for project success (Manu, Ankrah, Chinyio, & Proverbs, 2015). The alliance contract (AC) and the third edition of the New Engineering Contract (NEC3) already focus on cooperation, each in their own way (Boot, 2010; Chao, 2016; Sakal, 2005; Suprapto, 2016; Watermeyer, 2015). This research will look into the AC and the NEC3 in order to find the positive aspects that can be applied to future integrated contracts or administrative conditions regarding the level of trust between client and contractor.

It may also be possible for companies to implement control mechanisms to support trust building in complex construction projects (Badenfelt, 2010). It is however unclear how control mechanisms may affect the level of trust in the construction industry and which control mechanisms are the most advantageous to the level of trust. This research also aims to identify the most beneficial control mechanisms regarding trust in complex construction projects.

1.2 Relevance of research and research gap

1.2.1 Relevance of research

A lot of big projects performed under an integrated contract have not been as successful as they could have been in the last decades. In a recent newspaper article (Houtekamer, 2017), Van Wassenaer explains that many projects went over budget, realisation was delayed and many conflicts and disputes arose, which in some cases even resulted in disastrous situations for the companies involved. Examples of such projects in the Netherlands are the Noord-Zuidlijn in

Amsterdam, the N23 motorway in Noord-Holland and the Betuwelijn regarding infrastructure and for building projects the Rijksmuseum in Amsterdam and the Museumpark Parking in Rotterdam (Houtekamer, 2017).

In the Netherlands, the current tendency in the construction industry is that contracts based on the Dutch UAC 2012 or UAC-IC 2005, are based on conflict and mistrust (Houtekamer, 2017). Both clients and contractors are looking for new contracts for their building projects to build a trust relationship and reduce costs and the number of disputes. Even the Dutch government is, according to Koenen in an article in Cobouw, reducing the amount of projects performed under UAC-IC contracts (Koenen, 2017). This tendency is emphasized by the amount of other newspaper articles that are being published on the subject of cooperation and trust in contracts.

Clients, contractors and lawyers are looking for new ways to meet this need for more trust in complex construction projects. This research considers the discussion and may provide relevant viewpoints and guidelines for future projects.

1.2.2 Research gap

Trust, contracts and control mechanisms have been the subject of studies conducted in the past. Trust is a subject that is often returning in social, philosophical and psychological research, whereas contracts and control mechanisms are subjects of legal research. Not much research has been done towards a combination of these different fields of research. In this research, these different fields of research will be combined. Research gaps have been identified:

- Trust has been described in many studies and definitions have been formulated. Trust as a concept has many different definitions and it can be interpreted differently by every single person (Bijlsma-Frankema & Costa, 2005). The concept of trust will in this current research be reflected on the construction industry specifically. Previous research (L. Cheung, 2015; S. O. Cheung, Wong, Yiu, & Pang, 2008; Klein Woolthuis, Hillebrand, & Nooteboom, 2005; Suprapto, 2016; Van Wassenaer & Thomas, 2008) has shown that trust is in some ways important to the construction industry. However, most studies stop at that point, not giving any further advice or handles for future projects. The current research aims at filling this research gap.
- Many studies (Bleeker, Herber, & Van der Zijpp, 2016; Scheublin, 2001; Van Leeuwen, 2015) have already been conducted into integrated contracts, especially since they are being applied more and more in construction in the last decennia. Most of these studies focus on infrastructure projects and are about stakeholder relationships, risk

management and general project management. This research focuses on building projects instead, because there is a tendency to apply integrated contracts in complex building projects as well.

- In previous research (Bleeker et al., 2016; Scheublin, 2001; Van Leeuwen, 2015), much has been said about the UAC-IC 2005. Some literature states that the UAC-IC 2005 is out-dated and requires a thorough review (Chao, 2017; Van Wassenaer et al., 2007). For example: responsibilities can be vague, there is no structure for communication and there is no pre-contractual duty to report (Bleeker et al., 2016, pp. 1-17). Also, Van Wassenaer and Thomas (2008, p. 6) state that there is a need for contracts in which more attention is paid to parallel interests of clients and contractors and change from a confronting setting to a cooperating setting (Van Wassenaer & Thomas, 2008, pp. 9-12). This research will provide a basis for future research into incorporating the trust relationship between client and contractor in contracts. For this research, the alliance contract and the NEC3-ECC contract types are specifically chosen. These contracts are more focussed on cooperation, communication and trust. By considering these types of contracts, it may be possible to point out the advantages and issue an advice for future projects and integrated contracts.
- Control mechanisms that are used to enforce certain aspects of contracts and agreements in construction projects have been researched (Badenfelt, 2010; Bijlsma-Frankema & Costa, 2005; Kadefors, 2004; Klein Woolthuis et al., 2005). However, it is unknown how the control mechanisms affect the level of trust and which control mechanisms are beneficial to the level of trust between client and contractor. This research fills this research gap.
- Only one project (International Criminal Court, The Hague) governed by a NEC3 contract has been realized in the Netherlands. This research will contribute to previous research (Chao, 2016; Geertsma, 2016) and forms the basis for future research regarding the use of NEC3 contracts in the Netherlands.
- Previous research regarding trust, contracts and control mechanisms is often qualitative and based on literature. This research will fill a research gap by using the opinions of experts instead. The Delphi method (section 2.3) and interviews (section 2.4) have been used and the results are compared to a literature review.

1.3 Research goals

In the current construction industry in the Netherlands, it seems impossible to operate without contracts and control mechanisms, but it is also impossible to operate without being able to trust each other in complex projects with multiple cooperating stakeholders. This seems

contradictory. This research aims to provide insight into the concept of trust in relation to control mechanisms and contracts.

In this explorative and qualitative research, it will be assessed in what way mutual trust between client and contractor is important for cooperation between people from different companies from the construction industry. Insight will be provided into the workings of trust between people working together on cooperative construction projects in the realization phase, which are governed by alliance or NEC3 contracts. Expert opinions will be provided and an advice will be issued for incorporating the concept of trust in complex building projects. The opinions of experts will be validated by means of a Delphi study and interviews with experts that have worked on projects governed by an alliance contract or the NEC3-ECC contract.

The goals for this research are set as follows:

1. Determine the importance of trust in complex building projects.
2. Issue an advice on which control mechanisms to apply to a project to positively influence the level of trust during building projects.
3. Find out how the concept of trust can be best described in construction contracts or administrative conditions.
4. Provide guidelines for incorporating trust in integrated contracts.

The outcome of this research can be used to improve future cooperation between construction companies, contracts or administrative conditions for integrated contracts in the Netherlands on the topic of trust in the building industry.

1.4 Research questions

“Trust has been identified as the most important behavioural factor in managing relationships. In construction, where collaboration among contracting parties is essential in order to accomplish sophisticated tasks that require multi-parties involvement, successful trust building within project team would certainly improve the project outcome.” (Wong, Cheung, Yiu, & Pang, 2008)

It is unclear how different stakeholders involved in construction contracts perceive trust as described in the introduction above. In order to have a successful construction project with innovative types of contracts, it can be useful to be able to assess and influence the level of trust within those construction projects. There are many types of trust; this research concerns only the trust between people from different companies working together in a complex building

project, which is performed with an integrated contract. In order to provide an answer, research is done towards alliance contracts and NEC3-ECC contracts.

This leads to the main research question (**RQ**) of this report: **How can mutual trust between client and contractor be incorporated in integrated contracts?**

In order to be able to find an answer to this research question, multiple other sub-questions need to be answered. These sub-questions will give more elaborate insight into the research problem.

SQ1 How can trust be defined in context of the construction industry?
Trust is an intangible concept; there are different types of trust and aspects that relate to trust. In order to conduct a research on this subject, a clear definition for the concept has to be formulated.

SQ2 Which aspects of trust are important in a construction project?
In order to determine the importance of trust, it is necessary to first determine the important aspects of trust in a construction project. These important aspects may be controlled in the process.

SQ3 How does the level of trust between client and contractor influence project success?
The level of trust between client and contractor can influence a project's success. In order to find out what the importance of trust is, it must be researched what the impact of trust can be and how this is reflected in the project.

SQ4 How do stakeholders perceive trust in current construction projects governed by UAC-IC 2005 contracts?
This sub-question will provide the current attitude of the construction industry towards the UAC-IC 2005 regarding trust. It is required to know the perception of experts in order to provide new guidelines for future contracts.

SQ5 How is trust described in the alliance contract and the NEC3-ECC contract?
In order to manage the level of trust in a construction project, it must be described in the contract itself. This sub-question will provide the basis for the description of trust in contracts.

SQ6 How do control mechanisms influence the level of trust between client and contractor?
Control mechanisms can safeguard or damage the level of trust between client and contractor during the project. It may be useful for companies to know whether or not an informal or formal control mechanism is desired. It may be useful to know in what way control mechanisms influence the level of trust.

SQ7 Which control mechanisms are beneficial to the trust relationship in construction projects?
Control mechanisms can be implemented in a project to ensure certain aspects of the process. When the most important aspects for trust and the current processes regarding trust and cooperation are known, it is possible to research which control mechanisms have an impact on mutual trust, either positively or negatively. In order to answer the RQ, it is needed to know the most beneficial control mechanisms.

SQ8 How can trust best be described in a contract or in administrative conditions?
If trust is important for project success, it can be desired to incorporate this concept in future contracts and administrative conditions. The answer to this research question will provide suggestions to describe trust in contracts.

1.5 Expected results

It is expected that a lack of trust between people working together in a construction project can lead to conflicts problems in cooperation, which in turn can lead to project failure. Everyone can imagine that trust is important for cooperation, but in what way trust is affecting the success of a project is unknown. One of the expected results of this research contain an answer to the question if stakeholders actually perceive trust as an important issue in construction contracts; and if so, in what way it is important and how the level of trust can be influenced. Another expected result of this research is an advice on which control mechanisms are better to apply than others, from a trust building perspective. This thesis will illustrate the effects of trust on construction projects. Guidelines for personnel behaviour during a construction project might be included. It is probable that contracts should provide certain control mechanisms to guarantee a certain level of trust or strengthen the level of trust between client and contractor.

It is expected that the level of trust in complex construction projects is dependent on multiple things: the way trust is described in the contract, the way the level of trust is supported by control mechanisms, the behaviour of the people involved in the project. Preliminary research showed that the current UAC-IC 2005 has not much attention for trust. It is expected that this

requires more attention in future contracts. Trust could be explicitly named in contracts and it may be backed and supported by suitable control mechanisms.
It is expected that the most suitable control mechanisms are the mechanisms that relate to communication between stakeholders. Also, the informal relationship between companies and people on the project is expected to be an important factor in keeping the trust relationship at a higher level. In order to strengthen the informal relationship, it may be possible to implement informal control mechanisms as well.

1.6 Reading guide

This thesis is composed of ten chapters, each of them dealing with different aspect of the research: Chapter 1 is introductory and describes the context of the research, relevance, research goals and the research questions. Chapter 2 describes the research design. In chapters 3, 4 and 5, the literature review is discussed. Each of the chapters covers a different topic for literature study: chapter 3 focuses on the concept of trust; chapter 4 investigates different sets of conditions and contracts; chapter 5 addresses control mechanisms that are used in the construction industry. Chapter 6 describes the interviews that have been held for this research. The chapter is subdivided into two parts: it provides an outline of the case projects and a summary of the interviews for each case project. Chapter 7 concentrates on the Delphi study. Conclusions are drawn in chapter 8. In chapter 9, the discussion for this research is presented. This chapter is divided into two parts: the scientific contribution and the limitations of the research. Recommendations for future research are provided in chapter 10.

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2. Research design

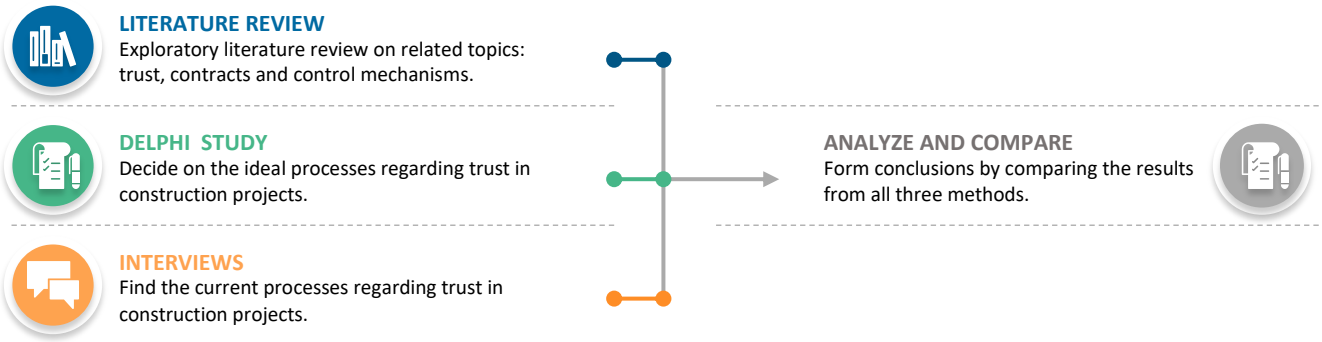
This chapter will elaborate on the research design and the different research methods that have been used for the research. In section 2.1, the general research design will be explained. Section 2.2, 2.3 and 2.4 will respectively explain the literature review, the interviews and the Delphi method.

2.1 Research design

This is an explorative and qualitative research. Due to the lack of factual data or all-encompassing definitions on trust, the research requires the opinions and expertise of others to be heard and analysed. Because all the data gathered relies on opinions, and therefore can be interpreted in a different way by each involved stakeholder or reader, the goal is not to come up with concrete solutions, but to reach a certain accepted truth or consensus concerning the problem and issue an advice. It will be an inductive process with several rounds of surveys conducted according to the Delphi method and interviews with experts. The problem stated is context-bound and the survey and research questions will develop over the course of the research itself, but within a set scope and frame of reference.

The literature study, interviews and Delphi method will each provide input to form conclusions. The methods will be performed parallel to each other and compared in order to form conclusion, as visualised in Figure 1: Research design.

Figure 1: Research design (own ill.)



The first step in this research will be an extensive literature review towards the topics regarding the alliance and NEC3 sets of conditions, trust in construction contracts and control mechanisms for trust. By doing a literature review, general knowledge on these topics will be gathered. The literature study will also focus on a comparison between an alliance contract and the NEC3-ECC contract to find the current written rules regarding trust. This will provide the basis for SQ1, SQ2, SQ3, SQ5, SQ6 and SQ7.

The second step will be performed after the literature study and consists of interviews with professionals that have worked on projects governed by an alliance contract or NEC3-ECC contract. The goal of these interviews is to learn about the current workings of trust in complex building projects and how this is incorporated in the contracts. The interviews will provide data for SQ1, SQ2, SQ3, SQ4, SQ6, SQ7 and SQ8.

Because of the explorative nature of this research and the lack of factual data, another research tool for this research will be a Delphi study. The survey will be held amongst experts representing different companies. Trust is something that is mainly assessed in a subjective manner. In order to be able to formulate a sound statement about the influence of trust on projects, some people with clear opinions and expert knowledge on the matter will be heard. Nowadays, people rely more on theory than practice. Especially in a case with something as intangible as trust, it might be the perfect way to define its relations when experts are able to give their opinion and together reach a consensus. The Delphi method is able to generate this consensus. The use of the Delphi method will provide data for SQ1, SQ2, SQ3, SQ6, SQ7 and SQ8.

The Delphi method alone will provide a consensus amongst experts, but it will still be a subjective outcome. In order to be able to form conclusions around the RQ, the consensus will be compared to the interviews and the literature review, to see what the best approach for incorporating trust in contracts could be for future projects.

2.2 Literature review

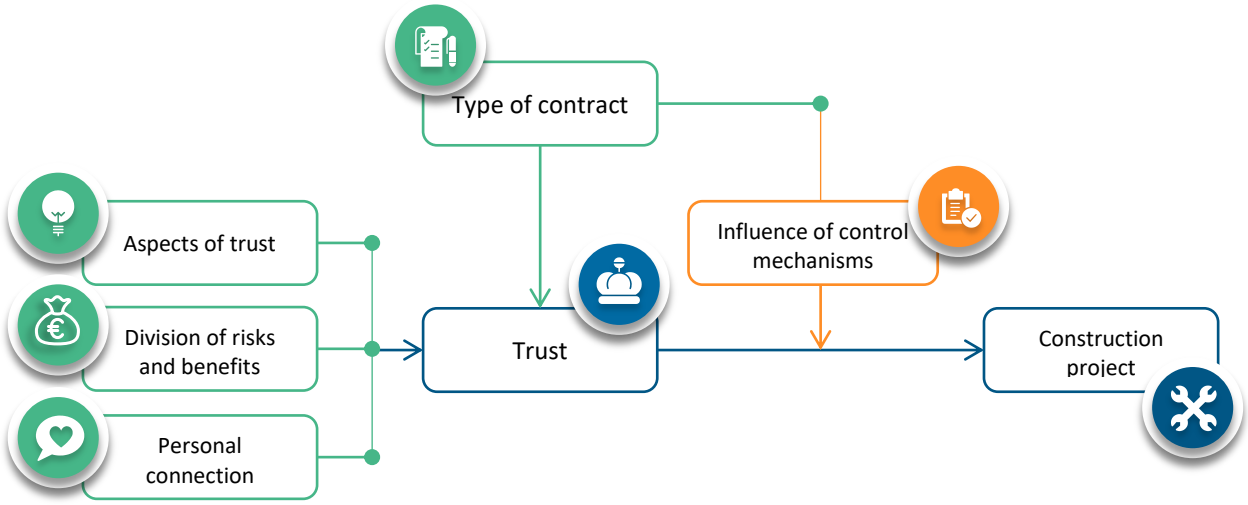
The main research question for this research is 'How can mutual trust between client and contractor be incorporated in integrated contracts?

Several different topics join together in this research question. In order to be able to formulate an answer, a literature study has been carried out. The main topics that are addressed in the RQ are trust and the different types of contracts. Also, the way trust can be handled by control mechanisms is one of the questions that will be answered. It is therefore that the literature study has been carried out on the topics of trust, contracts and control mechanisms. The conceptual model of the literature review is depicted in Figure 2.

The level of trust is of some influence on construction projects. Preliminary research showed that trust can be broken down into several different factors, e.g. aspects of trust, division of risks and benefits and personal connection. Also, the type of contract affects the level of trust.

Finally, the control mechanisms that are incorporated in the project also influence the level of trust.

Figure 2: Conceptual model of literature review (own ill.)



Trust in general is a concept that has been described by many authors over the years (Cook & Hancher, 1990; Hawke, 1994; Kadefors, 2004; Rousseau, 2007; Rousseau, Sitkin, Burt, & Camerer, 1998; Wong et al., 2008). Researchers have found different definitions for this intangible subject (Bijlsma-Frankema & Costa, 2005; Kadefors, 2004; Laan, Noorderhaven, Voordijk, & Dewulf, 2011; Robinson, 1996; Wong et al., 2008), which can differ per industry and culture. Methods to assess the level of trust have been described (Manu et al., 2015; Romahn & Hartman, 1999; Rousseau et al., 1998).

It is said that it is difficult to describe something as intangible as trust in legal enforceable terms (S. O. Cheung et al., 2008). Some contracts however, cover trust-related aspects instead. For this research, it has been chosen to involve only the AC and the NEC3 types of contracts. Until now, the NEC3-ECC contract has only been used in the Netherlands with the construction of the International Criminal Court in The Hague, but some research has already been done towards it (L. Cheung, 2015; Geertsma, 2016). The contract has however been used widely in several other countries in the world (Chao, 2016; Eggleston, 2015; Gould, 2007; Latham, 1994; NEC, 2014a; Watermeyer, 2014, 2015). Research towards and the use of alliance contracts are more common (Baker, 1990; Boot, 2010; Koning, 2010; Sakal, 2005; Scheublin, 2001; Van Leeuwen, 2015) and this type of contract will also be used in this literature study.

Control mechanisms for trust will be discussed in the literature study as well (L. Cheung, 2015; Chow, Cheung, & Chan, 2012; Elangovan & Shapiro, 1998; Fein & Hilton, 1994; Geertsma, 2016;

Kadefors, 2004; Klein Woolthuis et al., 2005; Manu et al., 2015; Mok, Qiping, & Yang, 2014). There are many different control mechanisms that can be used (Badenfelt, 2010; Evans, 2017), but only the ones in close relation to trust and the specific types of contracts have been incorporated in the research.

2.3 Interviews

Apart from the Delphi study, this research will also rely on several interviews to describe the current processes regarding trust. It can be used for validation or comparison of the consensus and to form conclusions. The interviews will consist of an analysis of a project performed under an alliance or NEC3 contract and questions with people involved.

Managers working on the projects will be interviewed and asked to answer questions regarding the project process, cooperation with other companies in the project, trust between the people working on the project and the control mechanisms that were in effect during the project. The interviews will provide the data to compare with the data received from the Delphi survey. By comparing the data from the two methods, sounds conclusions can be made.

2.3.1 Selection of projects

Upon the start of this research, some ideas for projects to incorporate in this research were discussed, amongst which a couple of infrastructure projects. Because the infrastructure industry is somewhat ahead of the building industry, it was decided to dig deeper into the building industry instead. The following selection criteria were applied:

- The project must be completed recently, in order to assess and reflect on the project's processes with the experts.
- The project must have been realized under an alliance contract or a NEC3-ECC contract.
- The project must be a complex and large building project with multiple involved parties.
- The project must be in the Netherlands, so the same rules and regulations are applicable to all projects.

The types of contract have not been used very often in the Netherlands. The NEC3-ECC contract has only been used in the building of the International Criminal Court (ICC) in The Hague. The alliance contract has no standard administrative conditions, so there are different variations possible. Some housing and utility projects have been realized with an alliance type of contract. Upon discussing with the graduation supervisors, it was decided that a sample of only two projects would suffice, one from each contract type.

The ICC has been chosen to be the case project regarding the NEC3 contract. The building was delivered in 2015 after three years of construction. It is considered to be a good example of a NEC3 project and the only NEC3 project in the Netherlands thus far. Contact with experts that have worked on the project was established via LinkedIn and email. The Isala Hospital (IH) has been chosen to be the case project regarding the alliance contract. The actual used contract was a variant of an AC, called the WIU-contract (Van Wassenaer & Thomas, 2008). The WIU contract will be further elaborated in section 4.2. This project also matched all the criteria and the experts were willing to help.

2.3.2 Selection of experts

Once the projects had been chosen, the right people to interview had to be pointed out. In order to point out the right people to interview selection criteria for experts were formulated:

- The expert must have worked on the project.
- The expert must have been involved in the pre-contractual phase of the project.
- The expert must have knowledge from the contract type (NEC3-ECC or alliance contract).

The experts were found searching on the internet and using the professional network of the researcher. Once first contact with an expert was established, he was able to nominate more experts for the interviews. A complete list of interviewees is shown in Table 3. The interviewees all confirmed that their names may be mentioned in this report. For the ICC, project managers and a contract manager have been interviewed. For the IH, the contract advisor and the project director from the contractor have been interviewed.

Table 1: list of interviewees

Project	Contract	Interviewee	Role	Representing	Company	Experience
Isala Hospital	AC	Mr. A.G.J. van Wassenaer	Contract advisor	Client	Faithfullgoose	30 years
Isala Hospital	AC	Ing. R. Polinder	Project director	Contractor	BAM utiliteitsbouw	30 years
International Criminal Court	NEC3	M. Meulebeek	Sr. consultant / project manager	Client	Brink Management & Advies	5 years
International Criminal Court	NEC3	Drs. Ir. J. de vries	Contract manager	Contractor	To Interface	10 years
International Criminal Court	NEC3	Ing. P. Fondse	Senior project manager	Client	Brink Groep	30 years

2.3.3 Interview set-up

The interviews were all conducted at the interviewee's work location. The interviews took about 1.5 hours to 2 hours each. The interviews have been recorded with mobile phones and the answers to the questions have been written down in Appendix I: Interview Transcripts. The interviews were conducted in Dutch, because the interviewees all speak Dutch. The questions that were prepared for the interviews can be found in Appendix H: Interview setup. The questions are divided into four different categories: general questions, project related questions, control related questions and trust related questions.

The general questions in the interview are meant to provide some general insight in the experts' knowledge regarding the contractual models. The project related questions are questions about the tender, the consortium and the reasons for choosing the specific contract. With questions about the control mechanisms used in the project, more insight will be provided for the effect of formal and informal control on the trust relationship between client and contractor. The final questions are about trust specifically. Although the questions were prepared, they were not asked as such explicitly. The interviews were more interactive conversations in which all questions were addressed naturally.

2.4 The Delphi method

The main question stated in the research objective, 'How can mutual trust between client and contractor be incorporated in integrated contracts?', is to some extend relying on the opinion of the person you are asking. Trust is found to be a subjective matter, meaning that it is hard to find scientific evidence or hard data. Meanwhile there are many 'experts' with their own ideas on the matter, which should not be disregarded. There are several different ways to classify and put weight to the opinion of experts, of which the Delphi method is one.

With the Delphi method, it is possible to find a consensus amongst experts on a certain topic. Turoff and Linstone (1975) defined the Delphi method as follows: "Delphi may be characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem." The complex problem in this case is the way trust is affecting cooperation in construction contracts and the creation of value with projects in the construction industry. Because trust is intangible, hard to define and subjective, it is hard to measure and check its influence on contracts and cooperation. To do so, the opinion of experts is needed (S. O. Cheung et al., 2008; Ishikawa et al., 1993).

The Delphi method gives us a way to evaluate the opinions of several individual experts from different backgrounds. In the end, the goal is to reach a consensus upon which a conclusion can be based. The definition for trust of Turoff and Linstone (1975) can be translated into something simpler: The use of questionnaires to classify and put weight to the opinion of experts in order to reach a consensus regarding a complex issue.

2.4.1 History

The term 'Delphi method' refers to the oracle of Delphi in ancient Greece, which was consulted on matters that ranged from public policy to personal affairs. The oracle was said to be in contact with the god Apollo. In the 1950s, the Greek god Apollo was replaced by experts from the U.S. RAND Corporation. "Project Delphi," financed by the U.S. Air Force, was the name given to the first project for forecasting technological developments. The objective of the original study was to "obtain the most reliable consensus or opinion of a group of experts ... by a series of intensive questionnaires interspersed with controlled opinion feedback" (Dalkey & Helmer, 1963).

When the technique had proven its worth, other studies were rapidly conducted. Similar methods include the nominal group technique and the consensus conference. The nominal technique and the consensus conference use highly structured meetings of experts to collect information using a format that includes a discussion among the experts." (Streurer, 2011)

2.4.2 Use of the Delphi method

Some researchers have made lists of suitable methods to measure trust (Möllering, 2006; Paine, 2003; Seppänena, Blomqvista, & Sundqvistb, 2007). They all state that the main method to measure trust is a survey or interviews. Most of the researches require a huge number of respondents to be able to form conclusions; this is mainly because there are many correlations and attrition or non-response issues (Lyon, Möllering, & Saunders, 2015).

The DM is very suitable to make intangible matters more tangible and measurable. It is therefore that the DM is a sound method to use in this research towards trust (Lyon et al., 2015). Where other research methods use hard evidence and data, the DM can rely on the opinions of experts instead. For this research, the Delphi method has been selected as a suitable method to use. The DM has been selected for the following reasons:

- This study is a qualitative research towards trust in projects under alliance or NEC3 contracts in the construction industry. This complex and intangible matter requires the

knowledge of people who have experience with projects performed under these types of contracts. In a Delphi study, the opinions of experts are valued.

- A panel study will most appropriately answer the research questions, rather than any individual expert's responses. Delphi is an appropriate group method, leading to a consensus rather than hard factual data. Among other group decision analysis methods, such as nominal group technique and social judgment analysis, the DM is appropriate because it does not require the experts to meet physically.
- Anonymity is one of the key factors in a DM study. In the conservative construction industry, it is important that the respondents can reply on the questionnaires in full anonymity and without potential loss of face.
- Regarding the subject, there is only a limited number of experts available. The DM requires only a small number of respondents: 10 to 18 members in a panel. This also makes it possible to reach a consensus in a small timeframe.
- The Delphi method is flexible and it can be amended for follow-up questions or interviews. This allows for the collection of richer data and leads to a deeper understanding of the concepts and research questions.

The Delphi method is mainly used as a forecasting method by government organizations and companies; however, there is a large number of researches that have been done with the Delphi method that does not involve forecasting at all. Linstone and Turoff (2002) compiled a list of those researches in their book called "The Delphi method: Techniques and Applications" (Linstone & Turoff, 2002):

- Gathering current and historical data not accurately known or available
- Examining the significance of historical events
- Evaluating possible budget allocations
- Exploring urban and regional planning options
- Putting together the structure of a model
- Delineating the pros and cons associated with potential policy options
- Developing causal relationships in complex economic or social phenomena
- Distinguishing and clarifying real and perceived human motivations
- Exposing priorities of personal values, social goals

The Delphi method is mainly used for technological forecasting and evaluations. The problem that will be assessed in this research is a combination of researches relating to 'causal relationships in social phenomena' and 'clarifying human motivations' from the list of Linstone and Turoff (2002).

2.4.3 *Benefits and disadvantages of the Delphi method*

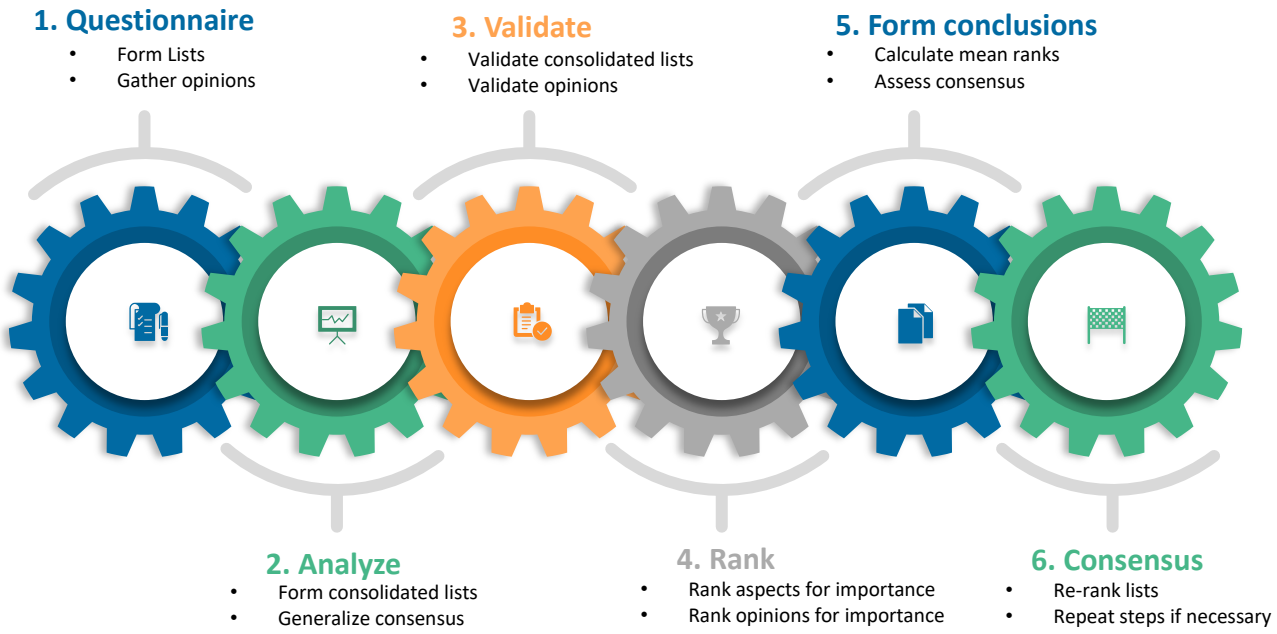
Compared to other techniques, the Delphi method has some few big advantages. One important advantage is that the surveys can be done via the internet, which lowers the threshold for cooperation from experts and simplifies the process of interviewing.

Another important benefit of the Delphi method is the anonymous response format. This means that the experts participating in the research can give their opinion without being influenced by other experts. Also, the experts are protected from losing face, because they can safely change their opinions regarding the questions in the survey. Okoli and Palowski (2004) formulated an extensive list for comparison of the Delphi method and a traditional survey method. The table in Appendix B shows the most important criteria for comparison between a regular survey and a Delphi survey.

2.4.4 *The Delphi methodology*

"A Delphi survey has three main tasks: First, defining and describing the topic and preparing one or more questions to send to the experts; second, selection of a panel of participating experts; and third, organizing and running the survey, which involves two or more rounds." (Streurer, 2011)

Figure 3: Delphi Survey Process (own ill.)



The first main task is to prepare the survey. The research topic and questions have to be determined. The survey can be conducted in a few different ways. The goal is to get to the core of the problem fast. This can be done by asking for parameters and weighing them, or predefine a list of parameters and ask the experts to add other important parameters.

The second task is to determine which experts to invite for cooperation with the research. The selection of experts is crucial for the conclusions and success of the research. The selection of experts can also be done in several ways. A common way is to ask two or more experts to suggest a few other experts. The experts have to be selected carefully according to a few predefined criteria, for example at least ten years of experience in the field. In order to make sure that the outcome of the research is broad and applicable to the industry, it is important that the experts are from different companies and backgrounds, the sample must be representative for the working population in the field.

The third task is the actual survey itself, consisting of at least two rounds of questioning. In the first round, questions or a list for completion is sent to the participating experts. Answers or additions to the list are returned and analyzed: the questions are reformulated and updated and the lists are adapted to the feedback from experts. The second round is focused around agreement: the participants rank their agreement with statements derived from the first round. It might be needed to continue with a third or even fourth round of interviews, depending on the gathered data. The result of the Delphi method is a consensus amongst all experts. The complete process of the survey is depicted in Figure 3: Delphi Survey Process.

2.4.5 Survey Method

It is important that it is easy to participate in the research. If the threshold is too high, the respondents will not participate and the chance for drop-out and attrition or non-response issues is too high. Therefore, the different surveys will be sent to the experts by email, using Google Forms. The surveys are in Dutch, because each of the respondent experts is Dutch. This lowers the response threshold even more. Upon receiving the filled-out questionnaires by the respondents, the data will be analyzed in order to prepare the next questionnaire.

Before sending out the questionnaires, a pilot questionnaire has been sent to several students and the graduation supervisors, to validate whether or not the questions and goals suit the research goals.

It will be known to all respondents who the other respondents are, but their answers to the questionnaires will remain anonymous. Only the researcher will know which respondent

answered what, to be able to ask follow-up questions if necessary. Anonymity is very important to the success of a Delphi research. Interaction within Delphi is managed in a totally anonymous way. This does not only assist experts in changing opinions without publicly announcing this (and risk loss of face), but also facilitates the research of any considerations based on their value. In addition, it also minimizes the negative impacts such as group pressure, status, and dominancy of powerful experts and provides little chance to win support for certain views at the expense of reaching a valid conclusion (Sourani & Sohail, 2014).

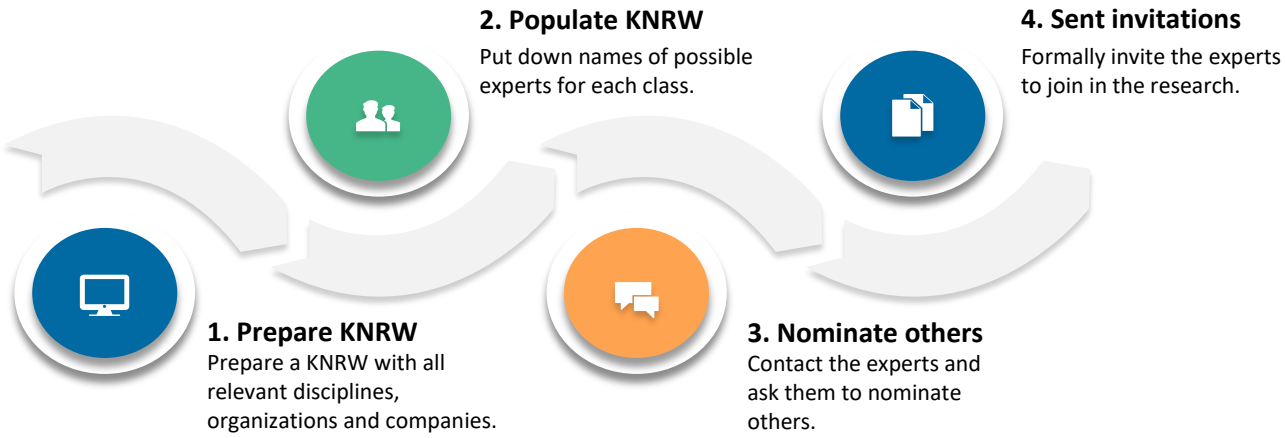
2.4.6 Selection of experts

A Delphi study does not depend on a statistical sample that attempts to be representative of any population. It is a group decision mechanism requiring qualified experts who have deep understanding of the issues (Okoli & Palowski, 2004). Therefore, the selection of the right experts is crucial to the success of the DM and the quality of the data, the consensus and therefore this research itself.

Okoli and Polowski (2004) created a step by step selection process for experts. This process is visualized in Figure 4: Selection of experts for a Delphi study. A Knowledge Recourse Nomination Worksheet (KRNW) is the basis for selecting the experts.

The KRNW is a tool to help categorize the experts before identifying them, to prevent overlooking any important class of experts (company). Once all the classes of experts have been defined, the KNRW can be populated with names from the specified companies or classes. If needed, the experts can nominate other experts for the study. Once the KNRW is fully populated with 10-18 people, the panel is considered to be substantial enough to start with round 1.

Figure 4: Selection of experts for a Delphi study (own ill.)



2.4.7 Preparing the KNRW

The KRNW has to be populated with organizations and companies that are suitable to consult for the survey. It is important to select people from different backgrounds in order to come up with a sound consensus that is all-encompassing and generalizable in the end. In a construction project, several different kinds of companies can be distinguished, for instance: Principal companies (clients), management companies (responsible for the management of projects), construction engineers (responsible for the calculations to the construction), architects (responsible for the esthetic design), construction companies (responsible for building the project) and installation companies (responsible for the technical installations for the project).

The preliminary KNRW, with the different companies is provided in Table 2. This preliminary KNRW only shows the different company classes and the companies that have been selected for this research. The companies have been selected based on the researcher's professional network. It reflects the general stakeholders in the construction industry.

The different companies probably would have somewhat different perspectives. Since it is a goal to obtain a reasonable degree of consensus for the entire construction industry, it is in this research not necessary to separate the classes into different expert panels, but try to form a general consensus by combining them in one panel instead.

Table 2: Preliminary knowledge resource nomination worksheet

Principals	Management companies	Construction Companies	Construction engineers	Architects
ICC	Twynstra Gudde	BAM	Pieters Bouwtechniek	Inbo
Isala	Brink Groep	Visser en Smit	Bartels	Alberts & van Huut
	To Interface	Boele & Van Eesteren	Verhoeven & Leenders	
	Stevens & van Dijck			

2.4.8 Selection criteria

In order to approach the right people for the Delphi study, selection criteria for the experts were formulated:

- The expert must have worked on a project with an AC or NEC3-ECC.
- The expert must have been involved in the pre-contractual phase of the project.
- The expert must have knowledge from the contract type (NEC3-ECC or AC).
- The expert must be willing and able to participate.

The experts were found searching on the internet and using the professional network of the researcher. Once first contact with an expert was established, he or she was able to nominate more experts for the interviews. A complete list of interviewees is shown in Appendix D: Selection of experts.

Literature (Okoli & Palowski, 2004) recommends selecting between 10 and 18 experts for the Delphi survey. The KNRW has been populated with names of experts that have received a formal invitation for the research. The KNRW can be seen in Appendix D: Selection of experts. The reason for an invitation to participate in the research and a short resume for each respondent can also be found in Appendix D: Selection of experts.

Because of reasons for privacy and anonymity, the names of the respondents have been left out. 28 Possible participants have been contacted and invited to participate. Only 18 experts have replied and actually participated. Of those 18 experts, six have worked actively on the Isala Hospital and six have worked on the International Criminal Court.

2.4.9 Data analysis

Data analysis with the DM can be either qualitative or quantitative. It is usually based on statistics, as will be done in this research. Consensus on a topic can be decided when a certain percentage of the experts involved in the study answer more or less the same. However, literature does not agree on the specific threshold for this percentage (Hsu & Sandford, 2007). Linstone and Turoff (1975, p. 266) mention that the use of percentage measures can be insufficient in determining consensus.

The major statistic elements that are being used in Delphi studies are measures of central tendency (means, median, and mode) and level of dispersion (standard deviation and inter-quartile range). In general, the uses of median and mode are favored. However, in some cases the mean is also applicable (Hsu & Sandford, 2007, p. 4).

According to Hsu and Sandford (2007), in literature the use of median score, based on a Likert-type scale, is strongly favored. Regarding the anticipated consensus of opinion and the skewed expectation of responses as they were compiled, the median would inherently appear best suited to reflect the resultant convergence of opinion (Jacobs, 1996, p. 57).

In this research, both the mean and Kendall's W will be used to determine importance and consensus. In order to be able to form a consensus and a conclusion, the results of the

questionnaires will be quantified. Kendall's W coefficient of concordance is recognized by literature (Schmidt, 1997) as the best way to interpret the results. The value of W ranges from 0 to 1, where a score of 0 indicates no consensus, and 1 indicates perfect consensus between the lists. Schmidt (1997) provided a table for interpreting different values of W, which can be seen in Table 3.

Table 3: Interpretation of Kendall's W (Schmidt, 1997)

Kendall's W	Interpretation
0.1	Very weak agreement
0.3	Weak agreement
0.5	Moderate agreement
0.7	Strong agreement
0.9	Unusually strong agreement

Kendall's W can be calculated in the following way: Suppose that object i is given the rank Ri,j by judge number j, where there are in total n objects and m judges. Then the total rank given to object i is:

$$R_i = \sum_{j=1}^{m} r_{i,j},$$

And the mean value of these total ranks is:

$$\bar{R} = \frac{1}{n} \sum_{i=1}^{n} R_i.$$

The sum of squared deviations, S, is defined as:

$$S = \sum_{i=1}^{n} (R_i - \bar{R})^2,$$

And then Kendall's W is defined as:

$$W = \frac{12S}{m^2(n^3 - n)}.$$

3. Trust

The concept of trust has been widely discussed in literature; however, trust in relation to integrated contracts in the construction industry is not researched as often. This chapter will discuss several of the definitions and compare them to find the definition of trust to be used in this research. The importance of trust is discussed, different types of trust are elaborated and methods of trust-building are reviewed.

Section 3.1 will explain the concept of trust in general and for the construction industry specifically. Section 3.2 will elaborate on the importance of trust for construction projects. The breakdown of trust is introduced in section 3.3 and further elaborated in section 3.4. Section 3.5 discusses measuring trust. Section 3.6 will provide conclusions for this part of the literature review.

3.1 Concept of trust

Due to its intangible nature, trust as a concept is difficult to comprehend. In literature, researchers have come up with several different definitions of trust. This section will describe the concept of trust. Based on this research, a new definition for the concept of trust will be introduced.

In the field of micro-economics, trust is seen as a calculated risk, presuming that trust comes from a rational evaluation, emphasizing the extrinsic and money driven values of trust (Rousseau et al., 1998). On the other hand, in the field of psychology, trust is seen as something without calculativeness, presuming that trust is sourced in a social orientation towards other people, emphasizing the intrinsic value of trust (Laan et al., 2011; Rousseau, 2007; Rousseau et al., 1998). Nooteboom (2002) assumes that on the side of the trustor, trust has both the rational reasons from micro-economics and reasons from psychological causes. For this research, both the economical and the psychological causes are of some importance. In the construction industry, much is based on economic transactions and incentives, and for long term relations and partnerships the psychological or social trust-builders are also involved.

Robinson (1996) has defined trust as “one’s expectations, assumptions, or beliefs about the likelihood that another’s future actions would be beneficial, favourable, or at least not detrimental to one’s interest”. Furthermore, Robinson states that a contract breach will lead to a loss of trust, which in turn will lead to decreases in virtue, employee contributions, and commitment towards the project. And like Sakal (2005) states in his article, there are many more examples of research in which it is shown that trust in an organization is essential for socialization, teamwork and cooperation in projects.

In their research to the key success factors of a partnering project in the construction industry, Radziszewska-Zielina and Szewczyk (2014) have a practical definition for trust: “the belief that the partners' decisions will be beneficial for both parties.” In this definition, trust is assumed to be based on transactions rather than feelings. The definition seems narrow and focussed on economic decisions and benefits. It may lack the psychological, social aspects of trust. The psychological aspects are needed for a long-term relationship and an open, friendly environment to work together (Rousseau et al., 1998). The psychological aspects are needed to make an adequate definition of trust processes in the construction industry.

According to Rousseau et al. (1998), there are two necessary conditions for trust. The first condition is risk, because it is considered essential in psychological, sociological, and economic conceptualizations of trust: trust would not be needed if projects could be carried out with complete certainty and no risk. The second condition is interdependence, because in construction projects many interests of one party cannot be achieved without reliance upon another party. In another article (Baker, 1990), a third essential condition for trust is defined as information sharing, such as exchanging organizational strategies or confidential information. It was reported that appropriate and honest information sharing can optimize mutual understanding and expectations among the partnering members.

Rousseau et al. (1998) have a definition of trust that does incorporate the psychological aspects. They define trust as “a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviour of another.” This implies that trust is not a part of someone’s behaviour, but a state of mind. This state of mind is influenced by someone’s attitude and disposition to trust: in order to be trusted, you must be able to trust others as well. In other words, one has to believe that people in general are trustworthy. The two-sidedness of trust and the connection it has with risk was also recognized by other authors (Bijlsma-Frankema & Costa, 2005; McKnight & Chervany, 2006; McKnight, Cummings, & Chervany, 1998; Nooteboom, 2006).

In order to have and need trust, the situation must also involve some kind of risk. Without risk, there would be no need for trust at all (McKnight et al., 1998). Examples of situations in which no trust is needed are when the client or contractor has a monopoly or when the client pressures the contractor into doing something and the contractor can’t refuse (hostage situation) (McKnight et al., 1998). In order to have an all-encompassing definition for the construction industry, risk will have to be incorporated. McKnight et al. (1998) argued that “trust concerns trusting intentions, a willingness to become vulnerable to another in a risky

situation, as well as trusting beliefs, the expectation not to be harmed by the behaviour of the other in this risky situation."

According to Dietz and Den Hartog (2006), trust is comprised of three different parts: a belief (expectation), a decision (willingness) and an action (risk). All three aspects can be found in the definition of Nooteboom (2002) and Kramer (2006): "the willingness to submit to the risk that things or people may fail us, with the expectation that they will not, or the neglect or lack of awareness of the possibility that they might." This emphasizes that people in general think trust is a default and it will be adversely affected when evidence to the contrary appears, leading to a lower level of trust. Laan et al. (2011) go even further by arguing that trust can be considered as an expectation that trustees will not engage in opportunistic behaviour, even in the face of opportunities for realizing gains by doing so. They define trust as "the expectation that things or people will not fail us, or the neglect or lack of awareness of the possibility of failure, even if there are perceived opportunities and incentives for it."

An overview of a comparison of the definitions for trust is provided in Table 4 below. The definitions have been compared on the bases of the different psychological states distinguished by Nooteboom (2002) (rational and psychological), the breakdown by Dietz and Den Hartog (2006) (belief, decision, action) and whether or not risks and benefits (McKnight et al., 1998; Radziszewska-Zielina & Szewczyk, 2014) are incorporated in the definitions.

Table 4: Comparison of definitions for trust

Author	Rational, economical	Psychological, social	Belief	Decision	Action	Risks	Benefits
(Rousseau et al., 1998)		○	○				
(Robinson, 1996)	○	○	○		○		○
(Radziszewska-Zielina & Szewczyk, 2014)	○		○				○
(McKnight et al., 1998)	○		○	○	○	○	
(Nooteboom, 2002)	○	○	○	○	○	○	
(Laan et al., 2011)	○	○	○			○	

For this research, a new all-encompassing definition for trust in the construction industry has been suggested, based on the previously mentioned definitions. The definition of trust used in this research is the following: 'Trust is the willingness of the trustor to risk vulnerability to the trustee, based on the expectation that the trustee will make decisions with positive intentions, without being harmed in the process or the need to control the actions of the trustee.'

3.2 Importance of trust

In order to issue an advice on how to incorporate trust in integrated contract, it is required to know the importance of trust in construction projects. This section will discuss this importance.

The relationships between client and contractor organizations within construction projects are often based on conflict and opposition (Laan et al., 2011). This holds true for relationships governed by traditional contracts, but also for the relationships governed by a modern type of contracts. Development of a relationship based on trust between principal and contractor seems to be difficult (Laan et al., 2011). The construction industry is project-based. In a project, different companies join together in one contract. Due to the time constraints of a project, the strict rules and regulations and the division of tasks, the companies always remain relative strangers to each other. Therefore it might not be surprising that the interaction processes between client and contractor organizations are often conflict-ridden and leading to unsatisfactory outcomes of construction projects (Chan et al., 2004).

Hawke stated in 1994 that trust in the construction industry is a mythology. He found that mistrust had been overwhelmingly deep-seated and long-standing, while trust was neither growing nor diminishing in the construction industry. Mistrust had become the base for transactions, rather than trust (Hawke, 1994). Even today, despite the obvious advantage, trust remains to be a stranger in construction contracting. According to Wong et al. (2008), confrontation remains the prevalent environment in the construction industry. People are not always self-interested and opportunistic. In business, one can also find honesty, integrity and decency (Klein Woolthuis et al., 2005).

Construction projects are often characterized by a high complexity, uncertainty and risk. Companies joining together in a construction project have to overcome these difficulties in order to deliver a successful project within budget and the predefined period of time. The project constraints lead to difficult to manage mechanisms that are involved in establishing and maintaining trusting, cooperative relationships between clients and contractors in the construction industry (Kadefors, 2004). A successful construction project should be supported by many factors. These include developing trust relations, equity of benefits sharing, effective

communication and competent management team (Shek-Pui Wong & Cheung, 2004). Mutual trust has been found to be one of the key success factors in maintaining relationships in partnering (Cook & Hancher, 1990; Laan et al., 2011; Radziszewska-Zielina & Szewczyk, 2014; Shek-Pui Wong & Cheung, 2004). The concept of partnering is described in section 4.0.2.

It has been suggested that trust helps to reinforce willingness, confidence, expectation, belief, behaviour and to overcome risk and uncertainty on the personal level (Wong et al., 2008). There is also agreement that trust is important in a number of ways on an organizational level: it enables cooperative behaviour; promotes adaptive organizational forms, such as network relations; reduces harmful conflict; decreases transaction costs; facilitates rapid formulation of ad hoc work groups; and promotes effective responses to crisis (Rousseau et al., 1998). Trust is regarded as a psychological state, not as human behaviour, and it is not equivalent to the concept of cooperation. However, trust is considered important to bring about in-depth cooperative processes. If trust is present, people can spontaneously engage in constructive interaction without suspicion (Kadefors, 2004).

If a trusting relationship between companies develops, communication will be more frequent, risks and uncertainties will be more transparent, management of these risks will be more effective, construction processes more efficient and overall project outcomes more successful; if trust between the two parties remains weak, it will be hard to realize the project (Laan et al., 2011). Furthermore, trust leads employees to have faith in the company or the project and buy in its policies and procedures to create a collegial working environment. The level of trust between the client and contractor grows if trusting acts can be reciprocated (Wong et al., 2008). However, the rule of reciprocity also works the other way around. Shown trust communicates to a partner that co-operation is anticipated and tends to be reciprocated with a behaviour that validates trust (Kadefors, 2004).

3.3 Aspects and Qualities of trust

Trust is an ambiguous and complex concept. The concept of trust can be different for each (sub) culture and (working) environment. Different norms and values relate to the ideas and concept of trust. Depending on their discipline and culture, researchers have concentrated on diverse aspects and types of trust (Kadefors, 2004). Trust as a concept involves elements of: experience, expectation, confidence, willingness, believe, behaviour, reliance, hopefulness, optimism, openness, interaction, division of work, honesty, punctuality, mutuality, dependency, sharing of values, performance, reputation, formal control, sharing of information, reciprocity, commitment, caring, responsibility, uncertainty and risk (Geertsma, 2016; Wong et al., 2008). The aspects may overlap on some points. In her graduation thesis, Geertsma (2016) compares

thirteen different literature articles for the aspects resulting in trust development. She finds ten different aspects of trust, of which 'job performance', 'open communication' and 'a clear role description' are the most mentioned aspects for the development of trust in a relationship in the articles.

Rather than identifying many aspects of trust, Kadefors (2004), Dietz and Den Hartog (2006) and L. Cheung (2015) define certain qualities a trustee must have to some extend in order to be trusted by the trustor. Kadefors introduced 'Ability', 'Benevolence' and 'Integrity' as main qualities and Dietz and Den Hartog added 'Predictability' as a fourth quality. All of these qualities are significant and required for trust to arise between parties in cooperation. The qualities encompass several aspects at once. The qualities and their description (Dietz & Den Hartog, 2006) can be found in Table 5 below. Each quality can be decomposed into several different smaller aspects, as described above. Table 5 also shows the aspects related to the qualities.

According to Dietz and Den Hartog (2006), when one or more of these qualities is lacking in a lesser or greater extend, trust might not arise between the involved parties. Dietz and Den Hartog (2006) state that trust can be compartmentalized, meaning that each different aspect of behaviour or quality of the trustee can be separately trusted or distrusted. The overall combination of aspects or qualities and their perceived level of trust will lead to the decision whether or not to trust the trustee.

Table 5: Trustee's qualities, description and aspects

Quality	Description	Aspects
Ability	The party's capability to carry out its obligations in terms of skills and knowledge.	Experience, confidence, punctuality, dependency, performance, formal control, responsibility
Benevolence	Benign motives and a personal degree of kindness towards the other party, and a genuine concern for their welfare.	Believe, willingness, optimism, openness, interaction, caring, uncertainty, risk
Integrity	Adherence to a set of principles acceptable to the trustee, encompassing honesty and fair treatment, and avoidance of hypocrisy.	Reliance, division of work, honesty, mutuality, sharing of information, reciprocity
Predictability	The consistency and regularity of the party's behaviour.	Expectation, behaviour, hopefulness, sharing of values, reputation, commitment

3.4 Types of trust

In different articles, researchers define multiple types of trust. Each type has its own characteristics and aspects involved in its development. Table 6 gives an overview of different types of trust found in the literature and their description based on literature.

Romahn and Hartman identify three bases for trust that explain why people place their trust on other parties in construction projects. They are competence trust, integrity trust and intuitive trust (Romahn & Hartman, 1999). Competence trust is about having experience and skills to perform a specific action. Integrity trust develops when both parties aim to create win-win situations and have benign motives. Intuitive trust is a feeling based on reason or tangible evidence.

Kadefors identifies three different basic types of trust than Romahn and Hartman (1999) did: Calculus-based trust, relational trust and institution-based trust (Kadefors, 2004). Calculus-based trust develops when a trustor deduces that the trustee's action will be beneficial to the trustor. Relational trust develops when both parties cooperate for a longer duration in time and interact often. Institution-based trust is based on the reputation an organization or individual has and the rules and regulations involved.

Table 6: Types of trust and related aspects

Author	Type of trust	Description	Qualities
(Romahn & Hartman, 1999)	Competence trust	Trust in the technical, organizational and managerial competences	Ability
	Integrity trust	Trust in a mutually beneficial relationship	Benevolence
	Intuitive trust	Trust based on reason and evidence	Predictability
(Kadefors, 2004)	Calculus-based trust	Trust in a mutually beneficial partnership based on heavy consideration and reasoning	Benevolence
	Relational-based trust	Trust based on long term relationship and proven worth	Integrity
	Institution-based trust	Trust managed by institutions, control mechanisms, laws and other regulations	Integrity, predictability
(S. O. Cheung, Wong, Yiu, & Pang, 2011)	System-based trust	Trust based on performance of the trustee, his positive believes and the type of control	Ability, benevolence
	Cognition-based trust	Trust in the trustee's knowledge, skills and communication	Benevolence, integrity
	Affect-based trust	Trust based on values, intangible feelings and rational expectations	Integrity, predictability

Another research states that trust can be categorized into system-based, cognition-based and affect-based (S. O. Cheung et al., 2011). The System-based type of trust develops when the trustee is both experienced and has positive believes in the project or process. Cognition-based trust develops with knowledge, communication and managing expectations. Affect-based trust is about having the right priorities and congruent values. According to some researchers (Wong et al., 2008), cognition-based trust is the most important amongst these three types, which indicates that the aspects communication, interaction and information are most important. Another study (Shek-Pui Wong & Cheung, 2004) highlights the role of system-based trust as the most important type of trust. In this research, the determining factors for this importance are formalized systems like law and contracts. The distinction between different types of trust made by Cheung et al. (2011) is considered to be the most complete and will be used in this research.

3.5 Measuring trust

Researchers have found that trust is important, however, there no consistent methodology to measure trust was found. Companies have relied upon customer loyalty surveys or employee morale surveys to determine how people feel towards an organization, but there is little in the way of research that specifically focuses on trust itself. This section will go into methods to measure trust during construction projects.

Some different ways to research and measure trust that have been used in the past, for example experiments, surveys, focus groups, interviews, model building, game theory, multivariate analysis projects and ethnographic studies (Paine, 2003). There is no all-encompassing research method to measure trust, mainly because there is no scientific evidence or hard data involved (Lyon et al., 2015; Möllering, 2006; Seppänena et al., 2007). There are however many people with clear opinions on the matter. Nowadays people's opinions are almost never valued as they should be (Linstone & Turoff, 1975). Especially in a case with something as intangible as trust, it might be better to define its relations when people give their opinion and reach conclusions based on these opinions.

Meng, Sun and Jones (Meng, Sun, & Jones, 2011) have developed a maturity model for supply chain management in the construction industry. In their research, they focused on the relation between the client and supplier. This tool could help to quantitatively measure the relation between client and contractor and to determine the relationship they are in. They have evaluated their model through a series of expert interviews. Their complete maturity model can be found in Appendix C.

3.6 Conclusion

From this literature review, it can be concluded that the concept of trust is intangible and different for each (sub-) culture and (working) environment. This makes it hard to formulate an all-encompassing definition for trust in the construction industry. Although hard to define, the research has shown that the level of trust is important for project success. In many construction projects, the relationship between client and contractor is based on mistrust rather than trust. The level of trust between client and contractor can, according to literature, influence the success of construction projects. A high level of trust can positively influence communication and cooperation between stakeholders; this may lead to cost reduction, shorter project planning and higher quality. Trust is more important in integrated contracts, due to the focus on cooperation in these projects.

As shown in section 3.3 and 3.4, this research has shown that trust can be broken down into different types of trust, different qualities and different aspects. According to the literature, the most important aspects for trust are performance, communication and a clear division of tasks. Combining different aspects can lead to four general qualities a trustee must have in order to be trusted: ability, benevolence, integrity and predictability. Moreover, trust is based on either rational (economical) or social (psychological) motives and in order to build a trust relationship there must also be some kind of risk and benefit. Once trust is established, a distinction can be made between different types of trust: system-based, cognition-based and affect-based trust. The level of trust is variable and differs throughout a project, because it is affected by everything that happens during a project. The most important aspects for trust will be further researched by means of the Delphi method (chapter 7).

This study showed in section 3.1 that several definitions for the concept of trust were found to be insufficient for the construction industry. Based on definitions in existing literature, a new definition for trust in the construction industry has been formulated: ‘Trust is the willingness of the trustor to risk vulnerability to the trustee, based on the expectation that the trustee will make decisions with positive intentions, without being harmed in the process or the need to control the actions of the trustee.’ This definition is all-encompassing for the construction industry and can be used to describe trust for future use in contracts. This definition will be validated in the interviews and by means of the Delphi method.

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4. Contracts

In this chapter of the literature review, more insight will be provided into the alliance contract and the NEC3-ECC contract, and the way trust is incorporated in these contracts. Both contracts are examples of integrated contracts in which cooperation, communication and trust form the basis. The way trust is incorporated in the contracts is compared and forms the basis for the Delphi study and the interviews.

In general, contracts are used to capture an agreement between two or more parties. The official definition of a contract, as used in the Dutch Civil Code (DCC), reads as follows: “an agreement in the meaning of this title is a multilateral juristic act whereby one or more parties enter into an obligation towards one or more other parties” (translated from: article 6:213 paragraph 1 DCC).

Sections 4.0.1 and 4.0.2 introduce terms that will return several times in the report. Section 4.1 elaborates on the UAC-IC 2005 contracts, section 4.2 elaborates on alliance contracts and section 4.3 elaborates on NEC3 contracts. In section 4.4, the relation of trust and contracts is explained and in section 4.5, the different sets of conditions will be compared for trust. Section 4.6 will give the conclusions for this part of the literature review.

4.0.1 Temporary Multi Organizations

Different parties that partner together in one complex construction project can also be called temporary multi organizations (Geertsma, 2016, p. 54). This is described as a group of people or parties responsible for complex tasks over a limited period of time (project-based) and are typically cross-functional, consisting of members who have complementary skills and come from separate, fragmented but interdependent companies who share pre-defined goals and schedules (Geertsma, 2016, p. 54; Lehtiranta, 2014, p. 640). Companies can partner up in TMO’s when they have complementary responsibilities in one project or when they need each other for a tender.

Hanisch & Wald (2014, p. 198) state that the limited duration and non-routine tasks pose specific challenges to the coordination of temporary multi organizations. Integrated collaborations such as alliance and NEC3 are examples of temporary multi construction collaborations, where different disciplines work together to reach a mutual goal.

4.0.2 Partnering

Generally, according to Shek-Pui Wong and Cheung (2004, p. 437), partnering is interpreted as a generic management term to align project goals between the involved parties. Partnering can

lead to improving relationships among contracting parties, enhancing long-term alliances and it helps to achieve mutual benefits among the contracting parties (Shek-Pui Wong & Cheung, 2004, p. 438). Partnering in construction can be treated as an agreement between parties that facilitates effective resolution of problems and conflicts without a negative effect on the harmony between client and contractor (Baker, 1990, pp. 7-12). In a partnering structure, the working process becomes more efficient and redundant work and wastage will be reduced. Moreover, partnering improves both the site management and project coordination, due to the commitment of all parties including the contractors and sub-contractors (Shek-Pui Wong & Cheung, 2004, p. 438).

According to Bennett and Jayes (1995), partnering is based on three factors: mutual objectives, an agreed method for problem resolution, and an active search for continuous measurable improvements. Sometimes, formal alliances or other economic incentives are considered important in reinforcing common goals. Partnering in itself is not a written contract in definition and does not have to be legally binding; a non-binding partnering charter may run parallel to a contract to provide guidelines to the relationship between the partners (Baker, 1990, p. 12). Van Wassenaer and Thomas (2008) say that the partnering charter should preferably not be binding. They say that, since the charter is only meant to structure and motivate cooperation and trust, and therefore meant to strengthen a relationship, the charter should preferably not be used for contract termination. There are, however, some contracts that incorporate partnering guidelines, such as the NEC3 and alliance contract.

4.1 Integrated contracts

Integrated contracts are at the core of this research, more specifically the AC and NEC3 sets of conditions. However, more insight is needed in the Dutch UAC-IC 2005 to be able to formulate an advice on how to incorporate trust in this type of contracts. This section will describe the UAC-IC 2005 in general.

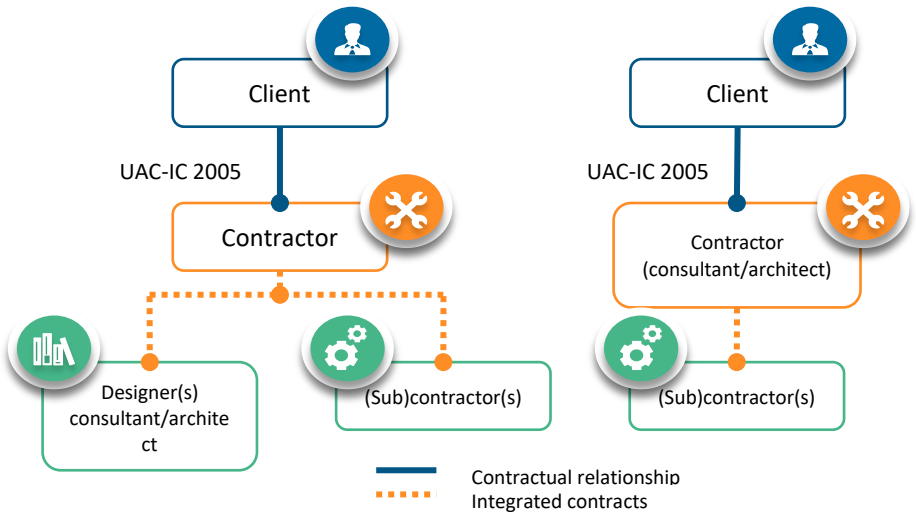
In complex building projects, multiple parties work together in one large project. Integrated contracts are used to offer a solution in this type of projects by making the projects more manageable (Van Leeuwen, 2015). In integrated contracts, both the design process and the construction process are incorporated in one contract with one party or TMO (Koning, 2010, p. 107). This one party does not have to carry out all the work on its own, but it can decide to use third party expertise if necessary. Incorporating the different activities and parties in one contract can have several benefits, for instance cost reduction, a decrease in risk, higher quality, shorter project planning and more innovation (Suy, 2015). Integrated contracts are not only used in the bigger, complex projects, but they can also be used in simple projects as well.

Bleeker et al. (2016, p. 1) state that integrated contracts are based on design and build or design and construct contracts. They originate from English-speaking countries, in which standardized contracts and sets of conditions have been used from the early 1990's. Examples of integrated contracts are: Design, Build, (Finance,) Maintain (and Operate) contracts; Project Alliance or Strategic Alliance contracts; Public Private Partnership contracts.

Due to a broad interest in integrated contracts, the CROW foundation formed a steering committee of lawyers, building experts and government representatives to formulate the first version of the Uniform Administrative Conditions for Integrated Contracts (UAC-IC). Because integrated contracts are being used intensively in the Netherlands, this specific set of Uniform Administrative Conditions has been formulated for Integrated Contracts and developed over the years (Suy, 2015). The most recent version of the UAC-IC has been introduced in 2005 (CROW, 2005a). One of the starting points for the UAC-IC 2005 is that the client has variable, flexible possibilities for an active or passive involvement in the project and project control (Bleeker et al., 2016, p. 2).

Figure 5 (Koning, 2010, p. 107) shows a schematic representation of an integrated contract: the agreement between the client and the contractor is subject to the UAC-IC 2005; the contractor can choose to involve third party sub-contractors. In this agreement, the contractor may execute the design himself, or he may award the design to a consultant or architect. For contracting a designer or consultant, the contractor could also apply The New Regulations 2011 (Dutch: De Nieuwe Regeling 2011), which are the general conditions for an agreement between an employer and an architect or consultant.

Figure 5: Schematic representation of an integrated contract (adapted from:Koning, 2010, p. 107)



4.1.1 *Uniform Administrative Conditions for Integrated Contracts 2005*

Because Integrated contracts are being used very often in the Netherlands, a set of general terms and conditions has been developed for it: Uniform Administrative Conditions for Integrated Contracts (UAC-IC) (Van Leeuwen, 2015, p. 7). In 2000 the first model agreements were applied under the Uniform Administrative Contracts for Integrated Contracts 2000. After a trial period of five years, the Uniform Administrative Contracts for Integrated Contracts 2005 (UAC-IC 2005) have been implemented for future use in the infrastructure and building sector (Bleeker et al., 2016; Koning, 2010, p. 108). The applicability of the UAC-IC is depicted in Table 7 below.

Table 7: Applications of the UAC-IC 2005

	Traditional contract			Long-term maintenance contract	Integrated contract	
Building phase	Executive management	UAC/RAW	Building team	Framework contract	Design & construct	Turnkey
Initiative	Client's responsibility					
Research						
Project definition						
Project requirements						
Draft design						
Final design						
Building specifications design						
Preparation of works						
Realization	Contractor's responsibility					
Maintenance						
Framework						
Tender	Tender procedure according to current tender regulations					
Contract	UAC	UAC	UAC	**UAC-IC**	**UAC-IC**	**UAC-IC**

UAC-IC contracts consist of several different parts: a Model Basic Agreement (MBA), annexes, an overview of project requirements, other legal documents and the UAC-IC 2005 general terms and conditions, which are all complimentary to each other (Chao-Duivis & Koning, 2015; CROW, 2005a). In the MBA the client and contractor both fill out specific project related issues, for instance the agreed price, requirements, tasks, planning, risks, et cetera (Van Leeuwen, 2015, p. 7).

In the UAC-IC 2005 several important terms and conditions are enforced (Koning, 2010, pp. 110-145), amongst which are the role of the client, obligations, requirements, payments, the role of the contractor, the liability, permits, authorization, termination, et cetera (CROW, 2005a; Kabu, 2016).

Table 8: Chapters in the UAC-IC 2005 (CROW, 2005a, 2005b; Kabu, 2016) and their description

UAC-IC 2005 Chapter	**Description**
Chapter 1: General	This first chapter of the UAC-IC gives an overview of terms and provisions and their definitions in §1. Also, in §2, the legal representatives of all parties are named.
Chapter 2: General obligations of parties	In this chapter, the general obligations of both the client and the contractor are listed. §3 covers the role of the client in the project: the extent to which the client can interfere, assessment dates, the project requirements and the obligation to cooperate. §4 covers the role of the contractor: meeting requirements, obligation to warn the client in case of faults or defects, liabilities.
Chapter 3: Contract takeover and third party involvement	§5 states that the contractor need permission of the client before transferring responsibilities to third party stakeholders. §6 covers the acceptance of third party involvement and liabilities and responsibilities
Chapter 4: Planning and coordination	In this chapter, the obligation to comply with the planning and milestones is covered in §7 and the planning and coordination in relation with subcontractors is covered in §8.
Chapter 5: Permits, dispensations, decisions, permissions; regulations	§9 deals with the obligations the client has regarding the rules and regulations for the project. §10 deals with the obligations of the contractor. Both paragraphs deal with termination of the contract in case the obligation to cooperate is violated and the compensation in this regard. §11 covers the legal regulations and §12 covers safety and health
Chapter 6: Soil aspects	According to §13, all things regarding the soil on which the construction takes place and the potential risks for environmental pollution are the contractor's responsibility. The contractor is liable for any negative events.
Chapter 7: Amendments, suspension, termination and cancellation of the contract	§14 covers the contractual amendments made by the client. He can only make changes in writing and in consultation with the contractor; however, the contractor is obliged to perform according to the amendments. §15 covers the amendments made by the contractor. Both the client and the contractor should show restraint when initiating amendments. §16 covers the suspension of work and termination or cancellation of the contract. Time and compensation constraints are dealt with.
Chapter 8: Building site and advertisement	In this chapter §17 covers the use of the building site and §18 states that both parties can use the fence around the site for advertisement purposes.
Chapter 9: Quality Assurance	§19 covers the contractor's responsibility to manage and assess the quality of the project. §20 and §21 state that the client can assess and review the quality of the design and realisation of the project. §22 and §23 cover the procedure of acceptance.
Chapter 10: Handover and maintenance	§24 and §25 deal with project completion, acceptance and handover and how to deal with probable defects. §27 covers the maintenance period

	after project handover. §28 deals with the liability for defects after project handover.
Chapter 11: Long term maintenance	§29, 30, 31 and 32 deal with long term maintenance of the object, the acceptance of work, liabilities and planning.
Chapter 12: Payments, fines, bonuses	This chapter covers everything regarding payments made. §33, 34 and 35 deal with payments, terms and taxes. §36 and §37 deal with fines and bonuses.
Chapter 13: Security and insurance	In §38 the securities are covered. The model security is one of the appendices of the UAC-IC. In §39, the insurances and the responsible parties are described.
Chapter 14: intellectual property	Chapter 14, §40, deals with the intellectual property rights of both the client and the contractor.
Chapter 15: Damage	Chapter 15, §41, covers probable damage to the works done and the responsible and liable party.
Chapter 16: Default and failure	§42 covers defaults and failures from the client, §43 covers those of the contractor. In some cases this can be related to the termination of the contract, as stated in §16 and compensation in §33.
Chapter 17: cost reimbursement, term extension, impact of changes made	§44 deals with the cost reimbursement or term extension a contractor can claim from the client. In §45, the impact of the changes made by the client during the process is described.
Chapter 18: Settlement of disputes	In §46 it is described how both parties should capture the state during the project. §47 covers the settlement of disputes and §48 states that the Dutch law is applicable on the contract.

According to Van Wassenaer and Thomas (2008, p. 103), the UAC-IC 2005 suffers from the following flaws:

- Too many different procedures and combinations of procedures are possible.
- The effects of acceptance and influence of the client are limited.
- The UAC-IC does not actively motivate communication between parties.

The CROW intends to update the UAC-IC 2005 again in 2018. This research can be used in the process of updateing the UAC-IC 2005 in the future.

4.2 Alliance contract

In this research, the alliance contract (AC) is the type of contract that will be compared to the NEC3-ECC contract regarding trust in a construction project. This section will describe alliance contracts in general and how trust is involved in the contract and its clauses or provisions.

In traditional contracts, the client is responsible for the design of the construction project and the contractor is responsible for the realization of the project (Bruggeman, Chao-Duivis, &

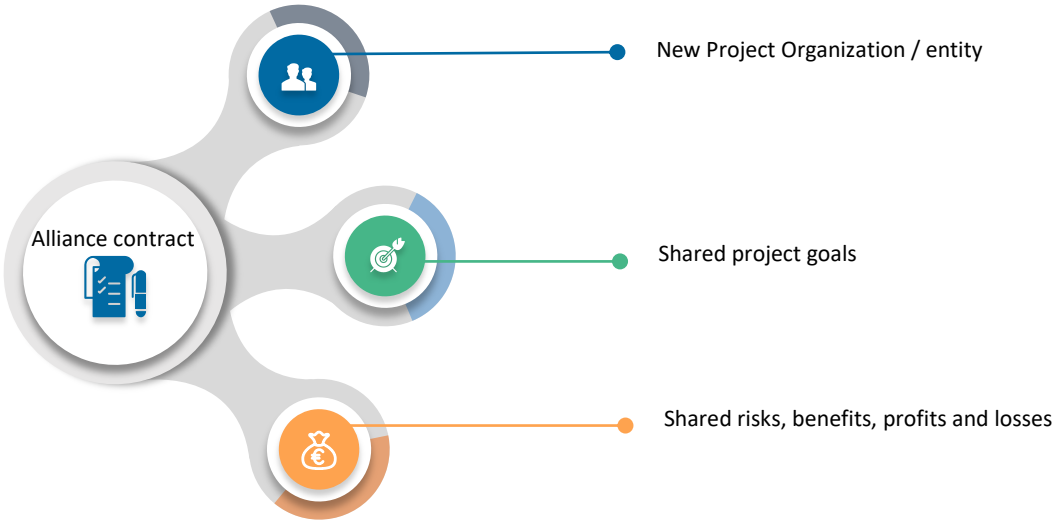
Koning, 2010, p. 35). As described in the manual for applications of an AC by the Dutch Rijksgebouwendienst (Deloitte, Ibr, & Stibbe, 2007, pp. 1-6), the purpose of an AC is to diminish the negative relational dynamics typical of traditional construction projects. In an AC, the project organization seeks to move away from the traditional and adversarial approach in which parties are mostly competitors (Laan et al., 2011). Alliance contracts involve a collaborative process which aims to promote openness, trust, risk sharing, responsibility and the alignment of interests between clients and contractors. The focus is on the best arrangement for project delivery, rather than self-interests. (Deloitte et al., 2007, p. 3; Van Wassenaer & Thomas, 2008, p. 68) The AC is mainly being used in the design phase of a project (ProRail, 2015).

There are two possible forms of an AC: a project alliance and a strategic alliance (Boot, 2010, p. 187). The project alliance is the more common form in the construction industry and is only for the duration of the project (Deloitte et al., 2007, p. 3). Strategic alliances are mostly adopted for a longer duration. Strategic alliances have the purpose of changing a company's position in the market, whereas project alliances are focussed on integration of the different construction phases and tasks to reach the project goals (Deloitte et al., 2007, p. 3). The overall accepted definition of a project alliance in literature is: an agreement for the construction of a project, in which the client and contractor form a new entity that works under common goals, shared risks and benefits and shared profits and losses according to a predefined ratio (Boot, 2010, p. 189). Only the project alliance contract will be used in this research, every mention of an alliance contract in this research will refer to a project alliance.

Project alliances are particularly fitting for construction projects and their supply chains characterized by high complexity and risk, where the damage of not effectively managing this complexity and risk can be large, and conversely the benefits of successful project management are substantial (Laan et al., 2011). Therefore, in an alliance, most conditions for cooperation and control are drafted in the pre-contractual phase (Van Wassenaer & Thomas, 2008, pp. 124-125). The contract leaves not much room for flexible changes during the project.

The alliance model has two functions that need to be distinguished: it governs the cooperation between client and contractor and it describes the scope of the AC (Scheublin, 2001, p. 452). Cooperation between the parties is formalized in a new TMO or entity. In the AC it is also described how the project organization should operate and which stakeholder is responsible for each of the tasks (ProRail, 2015). An AC differs from most other contracts in the involvement of the client. Figure 6 shows the main aspects of an AC (Scheublin, 2001, p. 452).

Figure 6: Main aspects of an alliance contract (own ill.)



In an AC three types of stakeholders are involved: a client, a building contractor and the project entity. Each of the stakeholders has its own responsibilities and activities in the project (Boot, 2010; ProRail, 2015, p. 5):

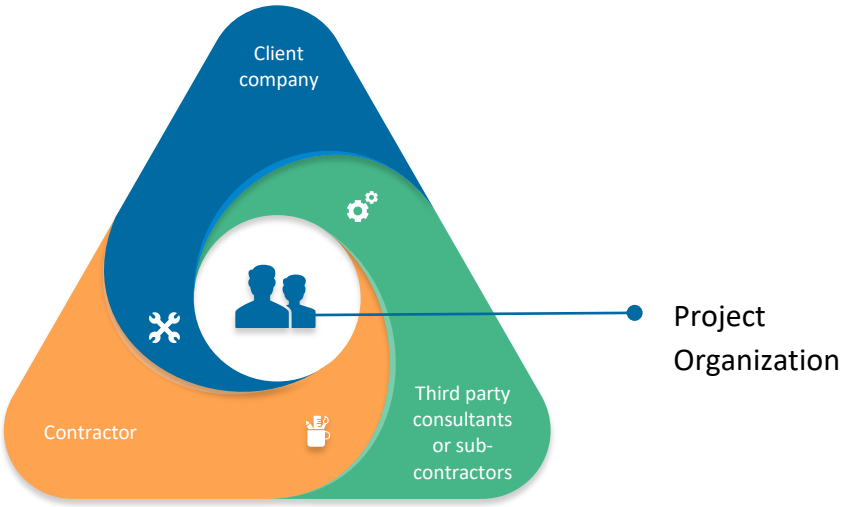
- The Client is responsible for formulating the project requirements and preconditions for realization of the project.
- The building contractor is responsible for the realization of the construction project.
- The alliance is responsible for the generation of a feasible design that meets the client's requirements.

Figure 7 shows the breakdown of the project entity: a client, contractor and optional third party stakeholders and sub-contractors (ProRail, 2015, p. 5). The entity is project owner and carries all the work and risks. In this way, every party involved has the incentive to deliver the best quality within time and budget (ProRail, 2015, p. 5). In an AC, any potential fault or defect will be attributed to the entity itself, so there is no incentive to cover up the fault or defect (Scheublin, 2001, p. 453). The involved parties are urged to deal with difficulties as quickly as possible and in cooperation. In an AC both knowledge and experience are integrated and processes and planning are matched for a better efficiency (Scheublin, 2001, p. 453).

The project organization is independent and is separate from the founding companies; the entity in itself is responsible for the successful realization of the project (Boot, 2010, p. 189). All contractual partners enter into one AC; in the pre-contractual phase, much time and effort is taken in the process of forming this entity (Boot, 2010, p. 189). Boot (2010, p. 189) also states

that it is important that everyone working for the entity is working with the same goals in mind, and not from the premise of the founding companies.

Figure 7: Formation of a new project organization for an alliance contract (own ill.)



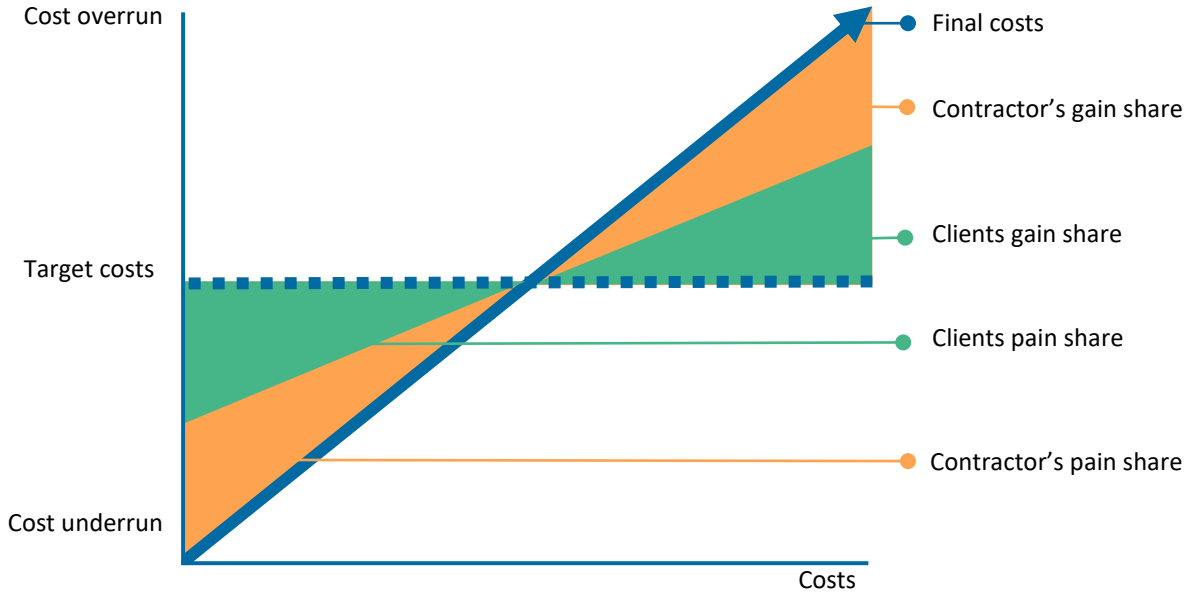
In countries other than the Netherlands, a lot is regulated about the mutual behaviour between client and contractor, and control of this behaviour by means of the contract (Van Leeuwen, 2015, p. 12). In an AC, the involved parties state their intention to cooperate and work considering mutual benefit and project success (Sakal, 2005; Scheublin, 2001). Specific terms and provisions are written down in the contract to support this. In the Netherlands however, some behavioural aspects of an AC are already covered in the Dutch Civil Code. Articles 6.2 and 6:248 DCC describe the terms 'redelijkheid en billikheid' (reasonableness and fairness); reasonableness and fairness are generally recognised principles of law, prevailing Dutch legal positions and relevant social and personal interests (article 3:12 DCC). Van Leeuwen (2015, p.12) states they are open and vague terms and refer to unwritten law. Besides an instrument for court, the term reasonableness and fairness also indicates a behavioural standard (Van Leeuwen, 2015, p. 12). The UAC-IC 2005 do not explicitly state how a party should behave towards the other party and they do not refer to the DCC, but the principle of good faith is included in some clauses of the UAC-IC 2005 (L. Cheung, 2015, p. 32). Clauses and provisions in an AC can be used to clarify this.

4.2.1 Painshare / gainshare

Essential for an AC, is equality amongst the partners in cooperation (Bennet & Jayes, 1995). They should have the same project goals, strife for shared benefits, share the risks and divide the profits and losses (Boot, 2010, p. 187). In order to share profit and loss, the painshare / gainshare model of Sakal (2005) can be applied to the AC. The painshare / gainshare model

states that both the client and the contractor share in profits or losses. In this way, they both have a financial incentive to cooperate. It also stimulates creativity and innovation for a better price-quality ratio (Fondse & Van Eijk, 2014, slide 10). A painshare / gainshare model of a 50/50 ratio between client and contractor is depicted in Figure 8.

Figure 8: 50/50 painshare / gainshare model (own ill.)



Each separate activity in the construction process is priced as a regular lump sum and a fee for subcontracts and the contractor's own work. The costs in the contract are described as the amount owed to subcontractors for work which was subcontracted plus the costs of components in the schedule of cost components for work of the contractor. The initial target will be adjusted for compensation events, changes to the work and other risks. When the project remains under budget, there will be a cost under-run, leading to profits to be shared amongst the client and contractor. When the project goes over budget, the losses of the cost overrun will also be shared amongst the client and contractor (Sakal, 2005; Watermeyer, 2015).

4.2.2 Different alliance contracts

There is no standard contract for alliance contracts, nor are there any administrative conditions (Scheublin, 2001). The AC, as described in this section, is for some parts based on the UAC-IC 2005, but it also differs on some clauses and provisions. Each alliance project has a new AC, with different clauses and conditions. For instance, in the interview with Van Wassenaer, he stated that in the Isala Hospital case project (Section 7), a specific variant of the AC has been used, called the WIU contract.

The WIU contract was drafted for the Isala Hospital project in the Netherlands. It has been formulated after intensive research to other contractual models and discussions with professionals from the industry, which has been described in the book Werkinuitvoering21.com: a set of conditions made by Van Wassenaer and Thomas (2008). Its core purpose is to motivate cooperation amongst different involved stakeholders. The starting point of the contract is the mantra: "To build within budget, within time constraints, in accordance with the expected quality norms, free of disputes and with as less nuisance as possible." (Van Wassenaer & Thomas, 2008, p. 1)

4.3 New Engineering Contract

In this research, the NEC3-ECC is the type of contract that will be compared to the AC regarding trust in a construction project. This section will describe NEC3 contracts in general and how trust is involved in the NEC3-ECC and its clauses or provisions.

4.3.1 History

The New Engineering Contract (NEC) was first published in 1993. It was a big change relative to the existing building and construction contracts at that time. For instance: it was written in plain language and designed to stimulate good management (NEC, 2014b). The simplicity of the language is meant to reduce the instance of disputes.

In this time, Latham (1994) was carrying out a review of contracting in the construction industry. He recommended that the NEC should become the national standard for contracts in both the private and the public sector. Partly because of the efforts of Latham (Gould, 2007, p. 1), the second edition was published in 1995, called the New Engineering Contract: Engineering and Construction Contract (NEC2-ECC). It had additional contracts called the Professional Services Contract for the appointment of a contractor to provide professional services and an Adjudicator's Contract for the appointment of an adjudicator to decide on disputes.

In 2005, after years of extensive international application of the NEC2-ECC, the third edition of the NEC family of contracts was introduced (NEC, 2005a, 2005b). This includes a Term Service Contract, a Framework Contract and a Supply Contract (since 2010). This third edition will be abbreviated as NEC3 in this report. The NEC3 is a family of contracts, because it has a specific contract for every contractual relationship (Geertsma, 2016, p. 33). The NEC3 Engineering and Construction Contract (NEC3-ECC) is the main NEC3 type of contract for the construction industry and will be used in this research.

The NEC3-ECC contract has been used in many construction projects around the world, especially in Great Britain, New Zealand, Australia and Hong Kong. In Holland the first project (International Criminal Court, The Hague) has been completed and the Dutch construction industry is still exploring its application on other projects (Geertsma, 2016, p. 33). Examples of project case studies in which the NEC3 has been used are the new airport terminal at London Heathrow Airport, the London 2012 Olympic Stadium, several wind farms in New Zealand and Australia, road construction works in Hong Kong and the Tin Shui Wai Hospital in Hong Kong (NEC, 2014a).

In June 2017, the NEC4 has been introduced. It has been updated to take into account any unprecedented levels of user feedback together with consultation responses, industry developments and emerging best practice since the use of the NEC3.

4.3.2 Characteristics of the NEC3

One of the characteristics of the NEC3 family of contracts is the modularity of these contracts: stakeholders can decide on multiple clauses and provisions whether or not to incorporate them in their agreement (NEC, 2005a).

In many partnerships governed by integrated contracts such as the AC, many tasks are still carried out under individualised, independent contracts. In complex construction projects, it can be useful to involve all stakeholders in the process to coordinate the cooperation and the integrated partnership (Chao, 2016, p. 16). This goes for both the practical and the juridical project approach. The NEC3-ECC is characterised by the complete alignment of the different model agreements and therefore the alignment of different stakeholders and their roles in the project (Chao, 2016, p. 16).

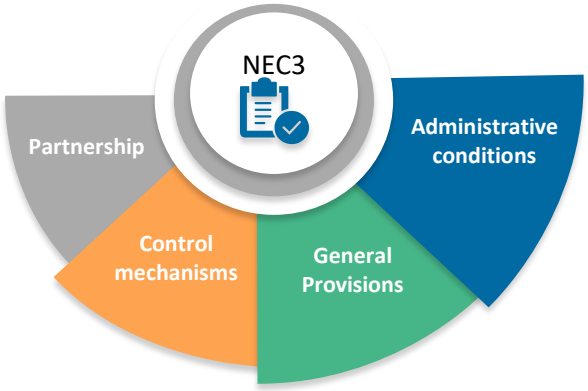
Another characteristic is the role of the concept of trust in the contract. As mentioned before in section 1.1, the NEC3 contract has a specific clause (10.1) regarding trust: “the employer, the contractor, the project Manager and the supervisor shall all act as stated in this contract and in a spirit of mutual trust and cooperation.” Acting in a spirit of mutual trust is something that returns in several provisions, such as the early warning system regarding risks, optional clause X12 for partnering and the painshare / gainshare model of the target contract. It can be argued however, if the concept of trust is legally enforceable (Eggleston, 2015, p. 85).

4.3.3 General overview

The NEC3 offers a specific contract for every contractual relationship within the building process, based on the philosophy of collaboration, transparency, early warning and trust (NEC,

2005a). As shown in Figure 9, the NEC3 combines different aspects of the regular Dutch construction process in one system: the administrative conditions, general provisions, control mechanisms and partnership. The NEC3 is applicable to many contract forms between client and contractor in the NEC3 family of contracts, just as the Dutch UAC-IC 2005 is applicable to Dutch integrated contracts.

Figure 9: NEC3 coordinated system (based on: Fondse & Beaujean-Kluijsters, 2014, slide 7)



A NEC3 contract is a modular contract, with some core clauses and several optional clauses from the administrative conditions (Chao, 2016, p. 5). It can be adjusted to the needs for a specific project or stakeholder involvement. The conditions consists of the following (NEC, 2005a): core clauses, main option clauses, dispute resolutions, secondary optional clauses, schedule of cost components, contract data.

According to Gould (2007, p. 4), the core principles of a NEC contract are flexibility, simplicity and clarity and a stimulus for good management. These core principles have been the basis on the core clauses that apply to all NEC contracts. The nine core clauses are (NEC, 2005a): general, the contractors' main responsibilities, time, testing and defects, payment, compensation events, title, risks and insurance and termination. The core clauses are described in Table 7.

With these nine core clauses, six main options clauses have been formulated as depicted in Table 10: NEC3 Contract options. Each of the contract options has its own risk allocation and payment option (NEC, 2005a). Option C: target contract is the most often used contract for complex projects (Watermeyer, 2015).

Table 9: NEC3 core clauses (based on: Gould, 2007)

Core Clause	Description
1. General	The first 'General' core clauses cover definitions, interpretations, ambiguities, other introductory matters and the early warning system. This early warning system is important for building trust in this contract type; it will be elaborated further in this section.
2. Contractor's main responsibilities	The second core clauses deal with the contractor's main responsibilities, requirements, design, personnel and subcontracting. Subcontracting is often done under a different contract.
3. Time	Core clause three is time. The NEC3 planning incorporates key dates or milestones. The use of these key dates should provide for multiple contractors to work at the same time, facilitating cooperation and progression of the project as a whole.
4. Testing and defects	Core clause four is called testing and defects. It covers the methods and context for testing and inspections. It also covers how to handle defects or faults in the construction when they are identified.
5. Payment	The fifth core clause covers the payments due. Assessment dates for assessing the amount due are established in the contract, regular intervals are discussed. The payments should be made within four weeks after the assessment date.
6. Compensation events	Compensation events are unique for the NEC3 contract, they are considered to be one of the key elements of the NEC3 contract. When a compensation event occurs and it does not arise from the contractor's fault, he is entitled to be compensated for the effects of the event. Compensation can be in the form of time and money.
7. Title	Clause seven covers the client's entitlement to plant and materials and the right to remove any equipment or materials on the building site.
8. Risks and insurance	Core clause 8 is about risks and insurance. This clause covers a risk register and states whether a risk is carried by the client or the contractor. An insurance table states the insurances that are required and which party is responsible for the insurance.
9. Termination	In clause nine, the reasons and procedure for termination of the contract.

Table 10: NEC3 Contract options

Contract option	Description	Most risk carried by:
Option A	priced contract with activity schedule	Contractor
Option B	priced contract with bill of quantities	Client: quality; contractor: design
Option C	Target contract with activity schedule	Contractor
Option D	Target contract with bill of quantities	Client
Option E	Cost reimbursable contract	Client
Option F	Management contract	Client

The NEC3-ECC is the main contract for the construction industry; the target contract with activity schedule (Option C) is the most used contract in the NEC3-ECC (Geertsma, 2016, p. 40). In this contract, a specified best estimate of the total cost of the work to be carried out is made. During the process, the initial target cost will be adjusted by the agreements between client and contractor to allow changes in the original specification if necessary (Watermeyer, 2015, p. 40). It is essentially a cost reimbursement contract in which the difference between the target cost and the actual cost is apportioned between the client and the contractor on an agreed basis (Watermeyer, 2015, p. 40). The pain share / gain share model as described in section 5.2.1 is also applicable to this type of contract. Both parties involved in the contract share in possible profits and losses, as in the alliance contract.

The secondary optional clauses are optional: clients and contractors can discuss which secondary optional clauses they want to incorporate in the contract (NEC, 2005b). The optional clauses focus, amongst others, on general changes in law during the project (X2), payment issues (X1, X3, X13, X14, and X16), liability (X4, X15, X17, and X18), time and performance damage or bonus (X5, X6, X7, and X20) and partnering (X12) (Chao, 2016, pp. 12-15). Also, option 'Z' is an empty clause, meant to be filled in by the stakeholders if needed. Option Z can be used for, for instance, attachment to the constitution or a confidentiality agreement (NEC, 2005a).

Secondary optional clause X12 'Partnering', is the most substantial optional clause (NEC, 2005b). It discusses the relationship between client and contractors and third-party involvement. The clause consists of four provisions that refer to clause 10.1, regarding trust. In a separate appendix, the parties can describe the required cooperation and its control mechanisms.

4.3.4 NEC3 Control mechanisms

As a contract, the NEC3-ECC relies heavily on planning, open book system, risk management, early warning and trust (NEC, 2005a). A short description of these concepts is provided below.

In the planning documents, everything has to be specified in detail. It is accompanied by a cost loaded program, specifying the costs involved in each task. This gives a certain weight to the schedule components and makes it possible to measure them (Watermeyer, 2014, p. 41). On regular intervals, or when needed, the planning can be revised in agreement with all stakeholders. Failure to comply with the planning is covered by the contract (Eggleston, 2015, pp. 159, 202). Everything is documented in an open book system so the project manager is able to inspect progress at any time. The ability to monitor and control the planning and costs of a project is one of the things that make NEC3 different (Geertsma, 2016, p. 40).

For a NEC3 contract, a risk register must be developed. The register contains all the risks that can be identified by the client and contractor at the start of the project, but it has to be adjusted and updated during the process. The early warning system of the NEC3 also helps to reduce risk (Gould, 2007, p. 6; Manu et al., 2015). The early warning system is covered in core clause six: compensation events. The early warning system ensures that the contractor will only be compensated in a compensation event when an early warning was given based upon the date on which an experienced contractor would have recognized the need to give a warning (NEC, 2005b). If such an event occurs and no early warning was given, the event will be assessed as if an early warning was given. This procedure is an incentive for the contractor because the client could use 'the benefit of hindsight' to decline the allocation of extra time or money to the contractor, had an early warning been given (Evans, 2017; Geertsma, 2016, p. 41).

An important aspect of NEC3 contracts is mutual trust between the stakeholders. Geertsma (2016, p. 43) states that the Dutch contracts in general have an attitude of reasonableness and fairness (as discussed in section 5.2) when it comes to cooperation and the NEC3 creates such an approach by the implication of a duty to cooperate whenever it is reasonably necessary to enable other stakeholders to perform his obligations. According to Van Wassenaer and Thomas (2008, p. 91), control mechanisms like the risk register, early warning system and open book accounting are very useful to support better cooperation between the parties that are involved.

4.4 Trust in contracts

This research aims to provide guidelines for incorporating the concept of trust in integrated contracts. This section provides the current ways trust is incorporated in contracts in the construction industry.

Construction projects generally last for a longer period of time, and they rely heavily on the interaction between client and contractor (Kadefors, 2004). This leads to the potential for affect-based trust to arise between client and contractor during a single project. Each project therefore has the potential to build a trust relation between organizations, which can last over multiple projects (Kadefors, 2004). Manu et al. (2015) argue that trust is essential for achieving flexibility, but that there are still challenges as to how a trust-based collaboration can be realized, especially when construction projects deal with multiple stakeholders.

Partnering projects are considered more successful than traditional construction projects (Baker, 1990; Chan et al., 2004). However, there is a risk for inexperienced parties to still end up in a traditional role in a partnering project (Kadefors, 2004). This suggests that the mechanisms involved in establishing and maintaining trust and cooperative relations in construction projects

are complex and may have hidden drawbacks (Kadefors, 2004). Kadefors (2004) also states inequality should be avoided when cooperating in a project, because it might harm the trust building process between different organizations. Different contracts may have a different effect on trust between organizations that are cooperating in a construction project. Also, the control mechanisms that are enforcing the contract can have either a positive or a negative effect, depending on the management, execution and the type of control mechanism.

The incentive system implicit in some contracts or control mechanisms, for instance the painshare / gainshare model or audits, can be contradicting with the requirements for benevolence and openness mentioned in the context of trust (Chow et al., 2012). Some methods will harm the trust relationship instead of strengthening it. It can be difficult for contractors to rely on construction law for behavioural guidance if they wish to inspire trust with their partners (Kadefors, 2004). Several other researchers (Chow et al., 2012; Eggleston, 2015; Geertsma, 2016; Laan et al., 2011; Manu et al., 2015) question that intangible concepts like mutual trust are legally enforceable.

Since the concept of trust is intangible and difficult to measure during a project, most contracts do not cover trust explicitly. However, they do have clauses for aspects regarding trust, like communication and control mechanisms. In the New Engineering Contract and alliance contracts, some attention is paid to the trust building process. For instance, in contracts provisions for communication and planning can be enforced, which in their turn they contribute to building trust in relationships by affecting behaviour, honesty, punctuality and other aspects. The different control mechanisms that are used during the project also affect the level of trust this way.

4.5 Comparison of contracts

In this section, a comparison between the different sets of conditions is discussed. Guidelines for a good construction contract are also presented. This will be used in the Delphi study and interviews.

Where the UAC-IC 2005 has been the Dutch standard for integrated, the NEC3 has been one of the International standards (Geertsma, 2016). The alliance model and the NEC3 are two different sets of conditions with the same purpose: to make multiple stakeholder involvement and cooperation possible in construction projects. Both contracts cover the design and construction phases, but their content is different (Geertsma, 2016, p. 46). Table 11 shows some of the differences.

Table 11: comparing the Alliance and NEC3-ECC contracts

Topic	Alliance contract	NEC3-ECC
Building Phase	Mainly design phase	All building phases
Work specification	Legal language Functional specifications Many additions have to be made to the contract	Clear language Detailed specifications Standard provisions cover many options and situations
Client involvement	Not necessary	Very strong client involvement
Third party involvement	Subcontracts needed	Can be incorporated in the contract
Behaviour	Based on mutual goals	Based on trust
Time	Strict planning, critical path method leaves no room for delay Strong supervision, separate responsibilities	Flexible planning, allowing for contractors to work parallel to each other Milestones, compensation events, assessment data
Control	Strong control Risk management, open book accounting	Based on trust Risk management, open book accounting, early warning system
Risks	Shared risks	Shared risks
Costs	Pain share / gain share optional	Pain share / gain share Activity cost schedule
Trust	Relationship important for cooperation Mutual goals, Shared benefits and losses (optional) Mainly system based trust	Specific clauses regarding trust Mutual goals, Shared benefits and losses Both system-based, cognition-based and affect-based trust

In her research, Cheung (2015, p. 184) compared UAC-IC 2005 with NEC3-ECC regarding trust and change management. Table 12 shows the comparison based upon eleven different trust criteria. According to Cheung (2015, p. 184), the UAC-IC leaves a lot of room for improvement, whereas the NEC3-ECC delivers high levels of trust due to the attention that is paid to cooperation. However, there still is room for improvement with the NEC3-ECC as well, especially with problem solving (criteria 5 and 10) and risk allocation (criteria 6).

Table 12: Comparison of trust building aspects (Adapted from: L. Cheung, 2015, p. 184)

Trust criteria	UAC-IC 2005	NEC3-ECC
(1) Trustworthiness of organization and the person during procurement: Track record, reputation, competences (financial, technical) (2) Trustworthiness during procurement: Culture, policy	(1) Procurement Act 2012: Apply the MEAT award criterion. The criteria may only be related to the contract that is being rewarded (1) Public Works Procurement Regulations 2012: The 'open procedure' and the 'restricted procedure' may be used freely, the use of the other procedures is restricted (1) Public Works Procurement Regulations 2012: Grounds for exclusion and minimum and/or suitability requirements merely lead to competence trust	N/A
(3) Joint goal setting	(3) Good faith in Art. 6:2 and Art. 6:248 in the DCC: The parties have to take each other's reasonable interests into account	(3) Good faith in the NEC3 ECC: The parties have to take each other's reasonable interests into account

		(3) Option for partnering
	(3) No other mutual objectives besides fitness for purpose	(3) Option for limiting the Contractor's standard of care
		(3) The fitness for purpose requirement is not explicitly stated in the NEC3 ECC
(4) Clearly defined communication system	(4) Limited communication requirements and no communication system. The Employer may be reluctant to provide information	(4) Extensive communication requirements, but no communication system
(5) Joint problem-solving	(5) Mutual warning obligation for errors in Contractor's and Employer's documents, but no early warning for risks. The sanctions for both parties are unclear though	(5) Mutual early warning for risks
	(5) Limited requirements to collaborate and to help resolve problems. Depending on the case, the principle of good faith in the DCC may lay down requirements on the parties to do so	(5) Risk reduction meetings to resolve problems together
	(5) Clear claims procedure, but the types of claims are not fully clear	(5) Open book regarding the Contractor's cost data in Main Options C-F
		(5) The CEs procedure is too extensive and complicated
(6) Equitable risk allocation	(6) To a large extent the risks are allocated to the party best able to manage them	(6) Many risks are not allocated to the party best able to manage them as the Contractor's risks are too broadly formulated
	(6) No risk sharing	6) Option to share the financial risk by means of a pain/gain share mechanism
	6) Ultimate risk allocation is unclear	(6) Ultimate risk allocation is unclear due to the CEs
(7) System for continuous improvement of the relationship (11) Emotional investments	N/A	(7+11) Option to measure the Contractor's performance by means of KPIs and incentives
(8) Reasonable behaviour	(8) Good faith in Art. 6:2 and Art. 6:248 in the DCC has three functions: interpretation, supplementation, and correction and limitation. The principle may not be fully effective as the UAC-IC 2005 do not refer to the DCC	(8) The requirement for all parties to act as stated in the contract and in a spirit of mutual trust and co-operation
	(8) The Employer may only instruct the Contractor to remove their representatives from the project, but not any member of their team	(8) The Project Manager may instruct the Contractor to remove members of his team from the project
(10) Problem-solving at the lower levels	(10) By default, the Court of Arbitration is authorized to settle disputes. Option to authorize the DAB to settle disputes, but generally, employers do not apply this option	(10) By default, the DAB is authorized to settle disputes. The board has to be set up before the starting date. Generally, parties often delete the DAB provisions
		(10) The Contractor loses his entitlement to compensation if he does not give a CE notification in time

In their book, Van Wassenaer and Thomas (2008, pp. 124-125), have formulated requirements for a 'good contract'. They state that a good contract must satisfy these mutual interests for clients and contractors sufficiently:

- To safeguard that the project can be finished within time.
- To safeguard that the project can be finished within budget from both the client's, as the contractor's point of view.
- To safeguard that the project will meet the agreed upon technical, functional and environmental requirements.
- To solve any faults, defects and disputes quickly, efficiently and righteously by the involved parties

In order to comply to these interests, the contract must contain the following (Van Wassenaer & Thomas, 2008, pp. 124-125, 167):

- Each party's scope and responsibility must be clear.
- Risks must be divided.
- The contract must provide guidelines for actual communication and sharing of information between all involved stakeholders.
- The contract must be practical and written in clear language.
- The payment method and pricing must be clearly stated.
- The contract should contain incentives and rewards.
- The contract should be flexible and adjustable to each situation.

According to Van Wassenaer and Thomas (2008, pp. 124-125), a contract that contains or supports the list above is able to support and strengthen cooperation and communication between client and contractor, and therefore their trust relationship in projects.

4.6 Conclusion

Contracts are used to make and enforce agreements between two or more parties. Both an AC and a NEC3-ECC are examples of integrated contracts, in which different parties join together in one TMO. There are no standard conditions for alliance contracts, which means that every AC is drafted from scratch, tailored to the project. The AC alternative for the Isala Hospital is the WIU contract. The WIU contract is based on the UAC-IC and several other types of contracts, as described in the Werkinuitvoering set of conditions.

This research has shown that trust is important for project success; the level of trust between client and contractor is affected by the contract and the applied control mechanisms. The rules regarding communication and cooperation can also be incorporated in a partnering charter. Both the AC and NEC3-ECC have a lot of attention for mutual trust between the involved parties. This attention is reflected by the contract clauses, provisions and the control mechanisms. The NEC3 and AC conditions both have general advantages regarding trust: explicit mention of trust, flexibility and control mechanisms.

The NEC3-ECC is not written by lawyers, but in common language instead. This leaves some room for interpretation and motivates communication amongst stakeholders. It also improves the practical application of a contract and radiates more trust. Moreover, the NEC3 explicitly states that the parties should act in spirit of mutual trust in clause 10.1; this motivates trust building between stakeholders.

The NEC3-ECC is more flexible than an AC contract regarding the involvement of sub-contractors. In an AC, the construction is governed by subcontracts for every third-party involvement, whereas in the NEC3-ECC the subcontractors can participate in the bigger contract under optional clause X12. In an AC, the project control is usually less flexible and more predetermined than a NEC-ECC contract. This flexibility can improve the trust relationship between client and contractor.

Because trust is one of the key factors in the contract, the contracts offer more room for cost reduction and incentives for a higher quality product. An incentive for cost reduction is the painshare / gainshare model from the NEC3-ECC target cost contract, in which the stakeholders by default share in their profits and losses and benefits and risks. In an AC, this is an optional choice. Because it is difficult to measure the level of trust, it is hard to find an all-encompassing method to control the level of trust during a project. It is however possible to implement control mechanisms for trust that affect one or more aspects of trust. The control mechanisms are further elaborated in chapter 5.

The experts' experience regarding the AC and NEC3 contracts will be reviewed in the DM and interviews in this research.

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5. Control mechanisms

This chapter covers the relation between trust and control mechanisms and it elaborates on multiple control mechanisms that are used with integrated contracts in the construction industry.

This chapter is divided into two parts: section 5.1, which elaborates on general control mechanisms in the construction industry; and section 5.2, which will further elaborate the control mechanisms in relation to trust. Section 5.3 will provide preliminary conclusions.

5.1 Control Mechanisms

This research aims to issue an advice on which control mechanisms to apply in order to strengthen the trust relationship between client and contractor. In this section, control mechanisms in general are described.

Control mechanisms are tools to enforce certain aspects of a contract during a project (Badenfelt, 2010, p. 301). Control mechanisms can be used to ensure the project's quality, planning and budget or cost arrangement (Chow et al., 2012). In complex construction projects, the project can be positively influenced by the level of trust between client and contractor, as stated before in section 3. It is possible for companies to implement control mechanisms that affect this level of trust during a project (Bijlsma-Frankema & Costa, 2005). The implementation of control mechanisms like audits, open book accounting, risk management or a code of conduct can be beneficial to the trust relationship (Badenfelt, 2010, p. 302).

There are different ways to distinguish control mechanisms. Klein Woolthuis et al. (2005, p. 814) propose in their article that control may be interpreted in a weak and in a strong way: in a weak interpretation, they regard control as any instrument or condition that might mitigate relational risk, this could include trust; in a strong interpretation, control is regarded as deterrence and based on power. Nooteboom (2002) and Klein Woolthuis suggest that relational risks can be mitigated in three ways: opportunity control, incentive control and benevolence or goodwill. These three ways of mitigating relational risk may be based on general, impersonal sources (macro) and personal sources (micro).

The control methods in Table 11 can be described as follows (Klein Woolthuis et al., 2005, pp. 815-816):

- Opportunity control refers to the limitation of opportunities for opportunism by restricting the actions of the trustee. It has macro sources: contractual enforcement; and

micro sources: exercising hierarchy and managerial orders in an employment relationship. Both the macro and micro sources entail monitoring of behavior to detect deviant behavior.

- Incentive control refers to the limitation of material incentives to utilize for opportunism due to dependence on the partner in the project. In macro sources, reputation and loss of face are considerations. In micro sources, this can be the case when partners rely on each other due to a unique value to each other; too high investments are needed for a relationship with another party; or a hostage situation. In this, investments may include the building of mutual understanding and trust.
- Benevolence, refers to the limitation of inclinations towards opportunism based on established social norms and values (macro), and personal empathy, identification, etc. (micro).

Table 13: Relational risk control methods (Klein Woolthuis et al., 2005, p. 815; Nooteboom, 2002)

	Control method	Macro, universalistic	Micro, relation-specific
Self Interest	Opportunity control	Institutional environment, Contracts, Legal enforcement	Hierarchy, Managerial order
	Incentive control	Reputation	Dependence (unique partner value, switching costs), Hostages
Devotion to others	benevolence	Values, social norms, moral obligation, sense of duty, bonds of kinship	Empathy, identification, routinization, affection, friendship

Badenfelt (2010) has also done extensive research towards control mechanisms in integrated contracts. An overview of control mechanisms and their types of trust and type of control can be found in Table 14: Control Mechanisms . Apart from the control mechanisms Badenfelt describes, many other control mechanisms exist that are often applied to projects.

Badenfelt (2010, p. 302) distinguishes two types of control mechanisms: Formal control mechanisms and informal control mechanisms. Informal control relates most to benevolence, whereas formal control relates to opportunity control and incentive control from the distinction made by Klein Woolthuis et al. (2005, p. 814). A formal control mechanism is incorporated in the contract and is therefore also a means to terminate the contract. The formal control mechanisms are specifically designed to enforce aspects of a contract or project, whilst the informal control mechanisms are implicit and mostly based on social interaction. Literature is unclear about which type of control is most suited for integrated projects; however, a some researchers (Bijlsma-Frankema & Costa, 2005; Chow et al., 2012; Fein & Hilton, 1994; Suprapto,

2016) prefer informal control mechanisms over formal control mechanisms in relation to trust. They have found that informal control has a more positive effect on the level of trust than formal control. Researchers do however not agree on the relation between trust and control. Chow et al. (2012) describe formal control and monitoring as a deterioration of trust, while others (Laan et al., 2011; Manu et al., 2015; Mok et al., 2014) argue that monitoring and formal control have a positive effect on trust development. The distinction between formal trust and informal trust will be used in this research.

Kadefors (2004, p. 178) explains the relation between trust and control mechanisms with an example: in a traditional lump-sum contract, the construction is awarded to the economically most advantageous tender (Dutch: EMVI, economisch meest voordelige inschrijving). The contractor goes to work and gets paid when the work is done. However, many aspects of the building design cannot be specified in objectively verifiable terms, and work may be hidden and impossible to inspect after the completion of the building. In order to be able to inspect and oversee the construction, clients employ their own supervisors on the building site. The presence of an unknown supervisor can make contractors feel suspicious and vulnerable to the client, leading to mistrust and conflict (Kadefors, 2004, p. 178). Contractors might try to defend their own position if things go wrong, rather than building more trusting and cooperative relations with the client, which would be beneficial to the process (Kadefors, 2004, p. 178). However, without a supervisor the client might feel the same way. Fein and Hilton (1994) have studied individuals responsible for monitoring the performance of other people. They have discovered that once suspicion has been raised about another person's motives or competence, a supervisor tends to apply another way of thinking, focusing on detecting signs of opportunism and bad performance instead (Fein & Hilton, 1994, p. 196). A way to balance trust and control must be adopted, in order to supervise projects without damaging the level of trust.

Table 14: Control Mechanisms (Badenfelt, 2010)

Control mechanism	Expressed problem	Actions	Control executer	Type of trust tested	Type of control	Possible contractor response
The target cost arrangement	Minimize the risk of possible cost escalation	Selecting a proper sharing ratio, fee and cost target	Project management consultant, project manager	Dedicational, competence	Formal	Proposing cost-saving measures, proposing constructive solutions
The decision model for determining when the target might be changed	Minimize the risk of possible cost escalation	Evaluation of management attitudes	Project management consultant, project manager	Dedicational	Formal	Expressing the intention to obtain repeat business and build a long-term relationship with the client
The open book accounting system	Minimize the risk of opportunistic behaviour	Investigate invoices	The project management consultant	Goodwill	Formal	Enable access
Project and progress Meetings	Maintaining trust	Asking questions about project	Project management	Goodwill, competence	Formal	Sharing project information, contractor upper

		status	consultant, project manager			management communicating to their staff the importance of behaving in a trustworthy way
Inspection and Supervision	Maintaining trust	Checking work quality and work progress	Project management consultant	Goodwill, competence	Formal	Contractor upper management communicating to their staff the importance of behaving in a trustworthy way
The project budget	Not expressed Minimize the risk of possible cost escalation	Investigating causes of cost deviations	Project management consultant, project manager	Type of trust cannot be identified Dedicational, competence	Formal	Displaying professional purchasing behaviour
Partnering Arrangement (not in contract documents)	Maintaining and building trust	Partnering inspired speeches	Project management consultant, project manager	Dedicational, goodwill	Informal (i.e. social control mechanisms)	Sharing project information, expressing the intention to obtain repeat business and build a long-term relationship with the client
Timetables and cost reports	Time escalation	Asking questions about project status, inspecting timetables	Project management consultant	Competence, Dedicational	Informal (behavioural control)	Contractors revealing Information
Web camera	Not expressed	Taking pictures three times a day	Client organization	Not expressed	Informal, Implicit	Not observable
Contractor responses to project changes	Maintaining trust	Evaluating management attitudes	Project management consultant	Goodwill, Competence	Informal	Proposing cost-saving measures, proposing constructive solutions
Extra work Reports	Maintaining trust	Checking title	Project management consultant	Goodwill, Competence	Informal	Not observable
Cost reports, invoices and project diary	Cost escalation	Asking questions about project status, inspecting invoices and project diary, evaluating management attitudes	Project management consultant	Goodwill	Informal	Contractors revealing information, offering the client direct access to the cost accounting system, proposing cost-saving measures
Design Documents	Problems outside client and contractor control (incomplete contract)	Negotiations	Project management consultant	Goodwill, Dedicational	Informal	Actions of reciprocity influenced by win/win dynamics
Project diary	Unclear time and cost accounting	Critical evaluation of project information	Project management consultant	Goodwill, dedication and competence	Informal	Contractors revealing information

Kadefors (2004, p. 177) states that from a rational, calculus-based perspective, detailed contractual specifications, monitoring of performance and severe sanctions for non-conformance should increase the trustee's motivation to cooperate and facilitate the development of trust amongst client and contractor. However, there is a preference for reciprocity in human behaviour (Kadefors, 2004, p. 177). Actions demonstrating trust and distrust tend to induce behaviours that are similar to or anticipated by the earlier actions. Kadefors further elaborates with two examples: Close monitoring communicates to a contractual partner or an employee that he or she is not trusted and that opportunistic behaviour is expected; economic rewards for cooperation hint that the target party will not take any action that is not motivated by self-interest. In addition, Elangovan and Shapiro (1998, p. 555) have found that extensive organisational control systems may affect the trustor's perception of the trustee. When cooperative actions of a partner are interpreted as responses to control, rather than as evidence of trustworthiness, the development of trust can also be damaged (Elangovan & Shapiro, 1998, p. 555).

Trust is for a big part dependent the trustee's behavior (Kadefors, 2004; Nooteboom, 2002; Robinson, 1996). Opportunities and temptations can make a trustee change its behavior and affect the level of trust between trustee and trustor. Opportunism is one of the pitfalls in building trust (Fein & Hilton, 1994; Laan et al., 2011). Lack of dedication and self-interest are examples of opportunistic behavior. Control over this opportunistic behavior can help to build trust during a construction project and in the pre-contractual phase; this control can be managed in a passive and active way (L. Cheung, 2015, p. 10).

Klein Woolthuis et al. (2005), Rousseau et al. (1998) and Laan (2009) conducted research towards trust, contracts and relationship development. They agree on the influence of opportunism on trust. However, they have found that the amount of control exercised over opportunism has a direct effect on the occurrence of opportunism and the level of trust. Rousseau et al (1998, p. 399) state that trust may not be seen as a control mechanism in itself, but it can substitute for control over opportunism. According to Klein Woolthuis et al. (2005, p. 833), trust is not supposed to be documented and agreed upon in contracts, because trust created by legal regulations forms a poor basis for a long term relationship. Too much formal control can also have a negative effect on trust building (Chow et al., 2012). It can evoke feelings of strict control and mistrust.

5.2 Control mechanisms in relation to trust

In order to find the most beneficial control mechanisms regarding the level of trust, the relation between control mechanisms and the concept of trust has been described in this section.

Every control mechanism is influenced by the level of trust or influences the level of trust (Badenfelt, 2010). Although there are many different control mechanisms, only the more common formal and informal control mechanisms in the alliance Contract and NEC3-ECC are a part of this research. Table 15 shows the control mechanisms and their intended effect on the project, the type of control and the type of trust. The control mechanisms are briefly described below and elaborated in Table 15.

Table 15: Control mechanisms

Control Mechanism	Intended effect on project	Type of control	Type of trust
Open book accounting	Transparency in budgets and hours	Formal	System-based trust Cognition-based trust
Early warning system	Prevention of defects and cost overruns	Formal	Cognition-based trust Affect-based trust
Supervision of works	Quality reassurance	Formal	System-based trust
Evaluations and assessments	Quality reassurance and change management	Formal	Cognition-based trust
Risk register	Quality reassurance and prevention of defects	Formal	System-based trust Cognition-based trust
Project Start-up	Personal relationship	Informal	Affect-based trust
Building process meetings	Progress reports and general communication	Informal	Cognition-based trust Affect-based trust
Code of conduct	Providing guidelines for behavior and communication	Informal	Affect-based trust

- Open Book Accounting (OBA) is used to provide transparency in accounting to all parties involved, and thus lead to the development of trust if nothing is withheld. OBA is useful to supervise costs, man-hours and record additional works (Badenfelt, 2010, p. 305).
- The Early Warning System (EWS) is incorporated in the NEC3-ECC as one of the standard control mechanisms in clause 16.1 and in the UAC-IC in clause 4.7. The EWS is considered one of the core principles of the NEC3-ECC contract, because it emphasizes the trust relationship between client and contractor greatly. It obliges the client and contractor to warn beforehand when they notice that things are not going according to plan.
- Supervision of Works can occur in multiple ways: supervision can be done by appointing a person as supervisor on the building site or it can be done by regular inspections. In relation to trust, supervision can be either negative or positive. If supervision returns a positive progress report and few faults and defects, the trust relationship between client

and contractor will strengthen. On the other hand, the trust relation will diminish when the supervision returns with negative feedback.

- The use of control mechanism Evaluations and Assessments can be done by organizing regular project meetings and progress meetings. At the meetings, the planning, use of resources, financial cost under/overruns or other changes in the process can be discussed.
- A Risk Register can be implemented to point out and manage the risks that can occur during a construction project. Potential threats and defects can be discovered and managed before doing harm. When a good risk register is formulated at the start of a project, this can help to build a trust relationship between parties. It can be beneficial to the level of trust when parties tackle risks head on in cooperation.
- A Project Start-Up (PSU) is a meeting which usually takes place when the tender is finished and before the works start. In this meeting, the people working together on the project can get to know each other and share their visions on the project. It is very important to know the persons you are working with, in order for trust to arise. It can be seen as a teambuilding event combined with some project content.
- Building process meetings are very common in the construction industry. They are regular meetings to oversee the project with all project managers and discuss progress and planning with each other.
- A code of conduct can be used to agree on rules for behavior, communication or other general things that the involved parties deem important. The code of conduct is usually formulated before the realization of the project with all involved stakeholders. It can be legally binding, but it does not have to be so.

5.3 Conclusion

In construction projects, control mechanisms are used to enforce certain aspects of a contract. Control mechanisms can be initiated and implemented by both the client and the contractor. They can be either formal or informal in their implementation, as described by Badenfelt (2010). Formal control mechanisms are used to enforce the agreements in a way that is also agreed upon in the contract. Informal control mechanisms are not described in contracts per definition, but can also occur more naturally during a project. Literature is unclear about which type of control is more effective, but it is agreed that implementation of formal control is easier and more common, because the rules and process regarding formal control are written into the contract. It is suggested that informal control mechanisms have a bigger effect on the level of trust.

The word ‘control’ does not radiate trust, it rather implies mistrust. However, control can also confirm that a party is trustworthy or make sure that a party does not cross a line and thereby becomes untrustworthy. In integrated construction projects, the process is either positively or negatively influenced by the control mechanisms, as illustrated by Figure 10. When the type of control or the way of implementation of the control mechanism is undesirable for one party, the level of trust will be harmed; when the type of control and implementation of the control mechanism is desirable, it will strengthen the level of trust.

Figure 10: effect of control mechanisms on the level of trust

The use of formal control mechanisms like open book accounting, risk management and early warning system can strengthen the trust relationship between contractor and client. In cases where the client uses these control mechanisms correctly and clients and contractors make note of each other’s willingness and positive track record, the level of trust will rise. The literature review shows that the most important control mechanisms prevent opportunistic behavior to arise and focus on affect-based trust. This contributes to SQ6 and SQ7. A way to balance trust and control must be adopted, in order to supervise projects without damaging the level of trust; therefore, it is also important to adopt informal control mechanisms next to the formal control mechanisms.

6. Interviews

This chapter deals with the interviews that have been done, in order to contribute to SQ1, SQ2, SQ3, SQ4, SQ7 and SQ8. The interviews are meant to give more insight into the current workings and processes regarding trust in construction projects. The goal is to see how the people working on the projects are considering the importance of trust and ways to manage the level of trust. The first section discusses the case projects for the interviews. The sections thereafter elaborate on the interviews and the analysis.

Section 6.1 introduces both case projects. Section 6.2 summarizes the interviews per case project. The transcripts of the interviews are found in Appendix I.

6.1 Case projects

In this section, the case projects are introduced and the construction processes have been briefly described.

6.1.1 International Criminal Court, The Hague

Figure 11: photo of the International Criminal Court in The Hague (stedenbouw.nl, 2015)

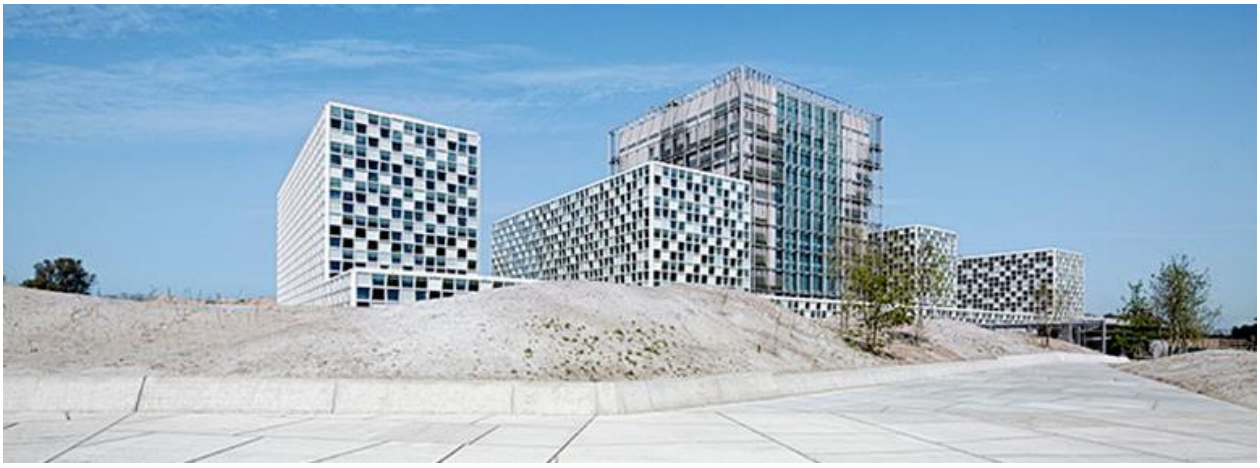


Table 16: General information International Criminal Court

	ICC Information
Location	The Hague, the Netherlands
Start-finish building process	October 2012 – September 2015
Estimated project value	€ 147.000.000,-
Size	52.000 m^2
Contract	NEC3-ECC Option C
Client	International Criminal Court
Contractor	Courtys: Visser & Smit Bouw, Boele & van Eesteren
Project manager	Brink Group

The International Criminal Court in The Hague was established by the Rome Statute in 2002. It is the world's first permanent, treaty based, International Criminal Court. The ICC was operating from an interim location in The Hague for 10 years. In December 2015, the ICC moved into its current premises. In October 2012, an NEC3-ECC option C contract (target contract with activity schedule) was established by a consortium called Courtys. Courtys consisted of the contractors Visser & Smit Bouw and Boele & van Eesteren, both part of the VolkerWessels Group. The project handover took place in September 2015. It was the first time that a NEC3 contract has been used in the Netherlands. The general information regarding the project is found in Table 16 above.

According to the International Criminal Court's Project Director Neil Bradley, "The objective of this project is to create the optimum balance between quality, functionality and cost, providing the states parties who established and continue to support the ICC with the best possible long-term value for money." (NEC, 2014c) The ICC was looking for a contract that promoted a collaborative, open-book approach and had a consistent record of delivering projects within the time and budget constraints. After comparing the Dutch UAV-GC and international FIDIC and NEC3 forms, it was decided to use the NEC3-ECC. "The choice of NEC3 was based on the view that transparency, mutual trust and collaboration will lead to a better result and better value for money," said Neil Bradley. "In particular we want to have the highest quality building delivered on time and within our budget. NEC3 is enabling us to have open and honest discussions with our contractor about some of the key elements of the project, as well as providing an incentive to the contractor to find better ways of achieving the same end result", he said (NEC, 2014c).

6.1.2 Isala Hospital, Zwolle

Figure 12: Design render of the Isala Hospital in Zwolle (hofstede-realestate.nl, 2013)

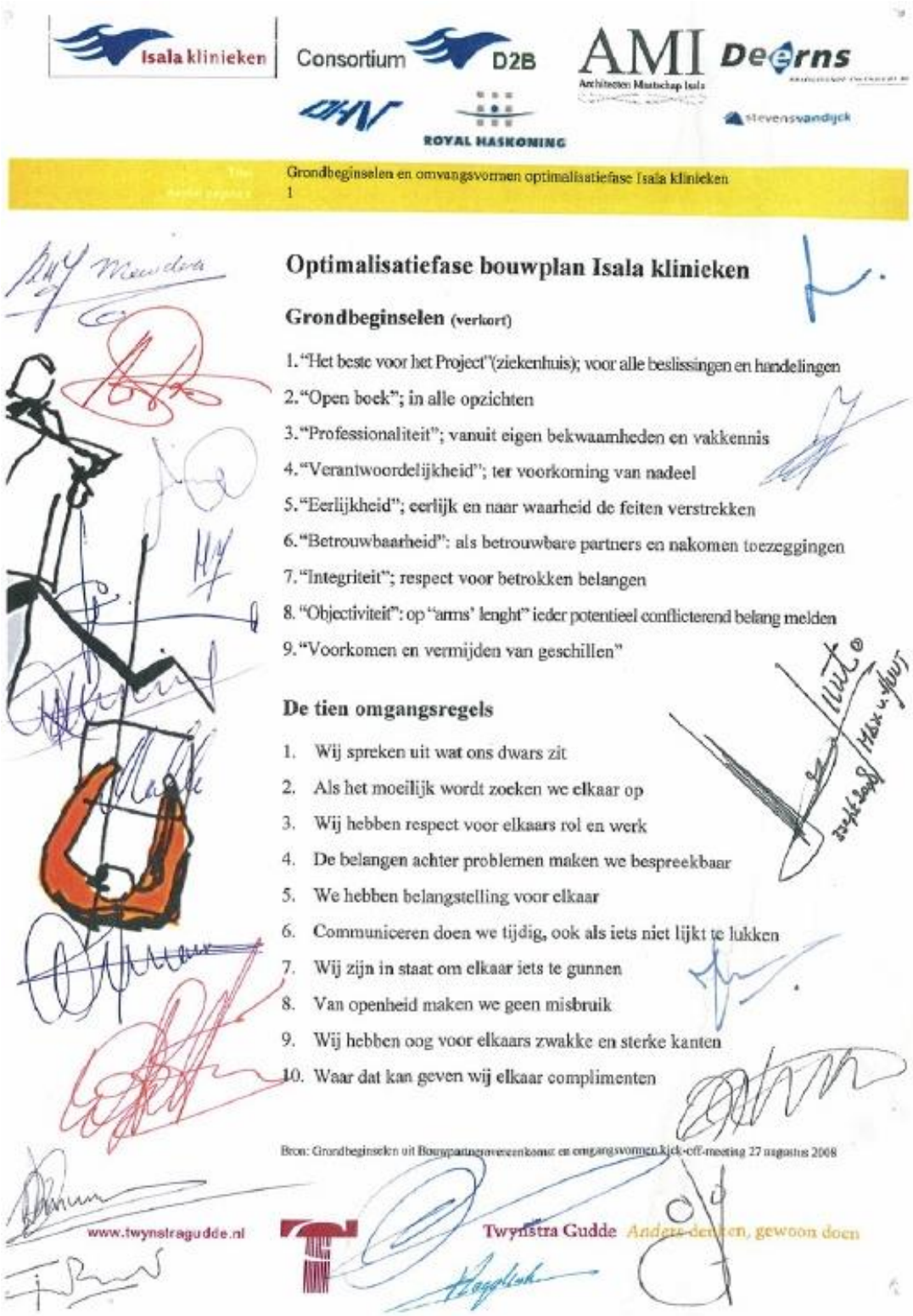
Table 17: General information Isala Hospital

	Isala Hospital Information
Location	Zwolle, the Netherlands
Start-finish building process	September 2009 – March 2013
Estimated project value	€ 210.000.000,-
Size	108.000 m^2
Contract	WIU alliance contract
Client	Isala Projectbureau Nieuwbouw
Contractor	Designed 2 Build (D2B): BAM Utiliteitsbouw Regio Oost, Unica Installatiegroep, Croon Electrotechniek, Kropman Installatietechniek, BAM techniek Regio Oost
Project manager	Twynstra Gudde

In the year 2000, the IH decided to build a new hospital. The former Weezenlanden Hospital and Sofia Hospital merged together and needed a new, shared location. The design contest was started. From the start of the project, the focus of the client was on the environment and the social, psychological aspects of the built: neighbors were involved, no nuisance was permitted, the architects had to show empathy for patients and hospital staff, etc. (Burger, 2013) After a very long start-up period, the construction was started in 2009 by the consortium called D2B. The project was performed under an alliance contract variant: the WIU contract.

A new contract was drafted on the basis of evaluations of previous hospital projects. Most previous projects were dominated by conflicts and disputes. With the IH, the realization arose that a new relation with the contractors is needed to have a successful project. The contractors had to be trusted and work in cooperation rather than conflict. The regular UAC-IC 2005 did, according to the IH, not suffice in this regard (Burger, 2013). New starting points were formulated in cooperation and the WIU contract was written down. The WIU contract facilitated several control mechanisms like planning tools, risk management and open book accounting, but more important were the rules and regulations regarding communication. An example is the code of conduct from Figure 13.

Figure 13: Code of conduct D2B (Burger, 2013)



Isala klinieken Consortium D2B AMI Architecten Maatschap Isala Deerns Strevenswandijck ROYAL HASKONING

Grondbeginselen en omvangsvormen optimalisatiefase Isala klinieken
1

Optimalisatiefase bouwplan Isala klinieken

Grondbeginselen (verkort)

1. "Het beste voor het Project"(ziekenhuis); voor alle beslissingen en handelingen
2. "Open boek"; in alle opzichten
3. "Professionaliteit"; vanuit eigen bekwaamheden en vakkennis
4. "Verantwoordelijkheid"; ter voorkoming van nadeel
5. "Eerlijkheid"; eerlijk en naar waarheid de feiten verstrekken
6. "Betrouwbaarheid": als betrouwbare partners en nakomen toezeggingen
7. "Integriteit"; respect voor betrokken belangen
8. "Objectiviteit": op "arms' lenght" ieder potentieel conflicterend belang melden
9. "Voorkomen en vermijden van geschillen"

De tien omgangsregels

1. Wij spreken uit wat ons dwars zit
2. Als het moeilijk wordt zoeken we elkaar op
3. Wij hebben respect voor elkaars rol en werk
4. De belangen achter problemen maken we bespreekbaar
5. We hebben belangstelling voor elkaar
6. Communiceren doen we tijdig, ook als iets niet lijkt te lukken
7. Wij zijn in staat om elkaar iets te gunnen
8. Van openheid maken we geen misbruik
9. Wij hebben oog voor elkaars zwakke en sterke kanten
10. Waar dat kan geven wij elkaar complimenten

Bron: Grondbeginselen uit Samenwerkingsovereenkomst en omgangsvormen kick-off-meeting 27 augustus 2008

www.twynstragudde.nl Twynstra Gudde Anders denken, gewoon doen

6.2 Interviews with experts

For the IH project case regarding the AC, interviews were held with Rens Polinder and Arent van Wassenaer. Polinder was project director for the D2B consortium and Van Wassenaer was juridical advisor for the IH and the one who wrote the WIU contract for the project. Polinder is representing a contractor and Van Wassenaer is a lawyer, therefore their visions are not congruent in every way. However, they do agree on most questions.

For the ICC project case, regarding the NEC3-ECC contract, interviews were held with Menno Meulebeek and Paul Fondse from Brink Group and with Joost de Vries from To Interface. Meulebeek and Fondse were project managers for the client in this project, and De Vries was the contract manager for the contractor's consortium. Even though they represent different stakeholders, their visions are more or less congruent with each other.

This section summarizes the interviews. The transcripts of the interviews with Van Wassenaer and Polinder are found in Appendix I2 and I3. The transcripts of the interviews with Meulebeek, De Vries and Fondse are found in Appendix I1, I4 and I5.

6.2.1 International Criminal Court, The Hague

The ICC is a large international private client. Meulebeek says that at the start of the project, a comparison between FIDIC, NEC3 and UAC-IC 2005 was made. The project was in the end performed under a NEC3-ECC contract for a few reasons: it lowered the threshold for international contractors to compete in the tender and because of its international character; the contract was in line with the vision of the ICC itself: trust, openness and cooperation; and the project manager from the client was very familiar with the contract.

With the ICC project, trust was not a formal part of the award criteria for the tender. However, De Vries states that clients always consciously or unconsciously have a specific view on every contractor's plans, values and vision, and therefore trust is always a part of a tender as well. The Courtys consortium won the tender. Courtys consisted of Visser en Smit, Boele van Eesteren and Homij/Imtech. The interviewees agree that the trust relationship and cooperation between all parties was of an unprecedented level with building projects in the Netherlands.

According to De Vries and Fondse, the NEC3-ECC contract offers several useful control mechanisms. One is a unique payment system, leading to cost reduction for both the contractor and client. The system shares profits and losses with a painshare/gainshare model. Accounting is done with open books; this makes room for a more efficient building process and allows for more open communication. De Vries confirms: the sharing mechanism leads to more

cooperation and communication and cost reduction in the end. This mechanism also leads to optimizations and innovations. According to Meulebeek, the open book system is also a means to remove any suspicion towards partners. Fondse thinks a financial incentive in general is very helpful to build trust for all involved parties in any project.

Other control mechanisms that have been effective were the early warning system, the risk- and opportunity register and the involvement of the NEC adjudicator. Meulebeek tells us that the adjudicator makes sure that disputes can be settled before they worsen and go to court. The neutral adjudicator mediates and advices in the project between client and contractor. Fondse thinks this intermediate step between conflict and court is useful to maintain the level of trust. De Vries tells us that with the UAC-IC 2005, the similar possibility for a dispute board almost always is excluded in the project, while he believes this is a certain help in a project. Due to the neutrality and professionalism of such a board, a lot of conflicts can be settled before they have a heavy effect on the project's budget or planning.

The control mechanisms in the ICC project were mostly formal; however, both formal and informal control mechanisms are required. The informal control mechanisms are very useful to improve on communication. Meulebeek thinks that every involved person works better in a trusting relationship. For him, trust means being honest and open and not to beat about the bush, but be straight in work and processes. De Vries states that when you are able to trust your partner, you are more likely to accept something which is positive for project success, even when it is not in something that is in your own interest. It is all about giving and taking, taking of the sharp edges and be reasonable, he says.

The contract was the basis of the success of the project. However, De Vries thinks that in the end, the people involved and their attitude towards each other and towards the project might be more important than the contract itself.

According to De Vries, explicitly stating trust as a clause can be useful to have as a boundary condition and to align the stakeholders in this regard. Fondse ads: trust in the NEC3 is also a means for terminating the contract, this makes for stakeholders to take it seriously and attentively. Trusting each other and helping each other where needed should be put into practice more often. Fondse states that it helps to write it down in a contract; however, it should be applied and maintained by all stakeholders. All the other articles should also provide guidelines for a trust relationship between client and contractor. Cooperation should be the main focus. Control mechanisms are needed as a tool to support building trusting relations and

cooperation in future contracts. De Vries thinks a combination of a financial sharing mechanism and early warning system will help to build trust.

The conditions in a contract should provide a basis of trust. Therefore, it is desirable to incorporate trust in a contract. However, each project is different, therefore each contract should be different and custom fit to the project. Fondse thinks the team is more important than the type of contract. The conditions for a good cooperation should be provided in a contract though. The rules and regulation should be discussed during the project. Communication can be supported in informal control mechanisms.

Fondse thinks that informal mechanisms should also be used in the pre-contractual phase of the project to get to know each other and build a trust relationship from early on in the project.

6.2.2 Isala Hospital, Zwolle

The IH project client was the private company Isala Projectbureau Nieuwbouw. The fact that it was a private company meant that the tender could be shaped more or less the way the client wanted, De Vries says. During the tender there was unusual focus on the informal, social aspects of the future cooperation between partners. Polinder explains that apart from the budget, trust was also an important factor during the tender.

There was a very long pre-contractual phase before the realisation of the project was started. During this period, the design for the project was made and the plans for realisation were formed. Polinders tells us that the design was done in cooperation with many stakeholders, from doctors to neighbours. Van Wassenaer and Polinder explain that the contract was written on the basis of extensive research into previously realised construction projects governed by integrated contracts, specifically hospital construction projects that had failed in some respects. This research was published under the title Werkinuitvoering21.nl (Van Wassenaer & Thomas, 2008) To the people involved, it was clear that the regular UAC-IC would not suffice. Van Wassenaer was closely involved in the writing of the WIU contract, which was based on the research.

Van Wassenaer elaborates on the contract: The contract was supposed to enforce a high level of trust between client and contractors. In the WIU contract, a lot of parts were based on the UIC-IC 2005, the alliance model and the NEC3 set of conditions. The core principle of the WIU was: we do whatever is best for the project. Other core principles for cooperation in the WIU were: trusting each other, open book accounting and no disputes. Polinder confirms that the

level of trust was unusually high during the project. Especially the informal character of the meetings helped with being able to trust each other.
Some control mechanisms were used to maintain the level of trust. OBA was effective and an extensive risk register was formed in the pre-contractual phase. The risk register also contained possible opportunities to be exploited when they would occur. Furthermore, Polinder tells about the early warning system. These mechanisms made sure that faults and defects were quickly handled when they arose. This all happened in complete consultation between client and contractor and with open communication.

Both interviewees confirm that every party involved in the project trusted the other parties. All the interests were in alignment. Van Wassenaer and Polinder both believe that the high level of trust was due to the informal communication and informal control mechanisms like the code of conduct showed before in Figure 13 on page 83.

Van Wassenaer states that there had not been a single legal dispute during the project, which is unique for a project of this size. Of course, there have been problems, Polinder says, but they were countered before they got the chance to worsen. Problems were separated from the people responsible and taken head on. Behavior around problems is very important for the trust and cooperation. In order to prevent disputes from going to court, a method for adjudication was implemented. A committee of three neutral members with different backgrounds was instated to reflect on the process and advice when conflicts arose.

Polinder believes trust is a combination of factors: Being able to make agreements, without having to worry about the results and cooperate with the same goals in mind. For Van Wassenaer the concept of trust means having each other's best interest at heart, act accordingly and according to the project goals at the same time. The parties should be able to rely on each other in vulnerability and benefit from each other. Certainty and trust are in line with each other, therefore a contract should provide certainty when needed and act as a safety net.

Both Van Wassenaer and Polinder believe trust is one of the most important things when cooperating in a construction project. Van Wassenaer believes that a contract with a focus on trust will only work when the clauses and provisions in the contract are completely lived through and operationalized by the involved parties. The interviewees say that the most important thing is to have common goals and act accordingly. There is no perfect contract as there is no flawless execution of error-free drawings, Van Wassenaer says. In the end, relational attitude and team-working quality are the most important factors for project success. Polinder

also states that the contract is not the most important thing, but the people managing and working on the project are. When the contract is signed, parties will automatically start to diverge. This needs attention during the project too, so a contract should be used to motivate communication and counteract diversion.

Polinder elaborates: explicitly naming trust in contract might help to support the purpose of a good contract: good cooperation, leave room for changes and flexible, ad hoc solutions. With the IH project, trust was not explicitly mentioned in the contract, but extra attention was paid to the trust relation with formal and informal methods. Extra additions should be made to the contract by a means of control mechanisms, for instance a code of conduct, reflection on the process and an adjudication committee. These control mechanisms are meant to deliver comfort to the process. Van Wassenaer adds to this that the human factor deserves the most interest; the contract can only provide boundary conditions for this cooperation.

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7. Delphi method

As described in section 2.3, the process of the Delphi method asks for multiple rounds of questions and data collection. The initial questionnaire for the DM is simple, since it consists of an open-ended solicitation of ideas; it is used to formulate the questionnaires that will follow after the first one. In this chapter, the Delphi study is described. Sections 7.1, 7.2 and 7.3 each describe a round of the Delphi study, followed by their respective results.

The literature review forms the basis for the DM. Preliminary lists of aspects for trust and control mechanisms have been formed based on literature. The lists are used in the DM: they are completed by the respondents and consolidated over the rounds. The definition for trust has been formulated in section 3.1; this definition will be validated in this DM. Moreover, the opinions of experts regarding the concept of trust, trust in contracts and control mechanisms are asked in open questions.

In formulating the phases and survey questions, the example research conducted and described by Okoli and Palowski (2004) and the PhD research conducted by Barry (2011) have been used. The complete and used questionnaires can be found in Appendix E to G. The sections that follow after this will elaborate more on the Delphi surveys and the data analysis.

7.1 Round 1

Phase one is meant to be an exploratory brainstorm phase. The purpose of the DM in this research is to find the ideal processes regarding trust in construction projects. In order to find this, the sub-questions have to be answered. The definition and aspects of trust must be validated, the importance of trust elaborated and the most suitable control mechanisms have to be determined. The first questionnaire can be found in Appendix E: Delphi Round 1 (Dutch). The questions asked in the first questionnaire are elaborated below.

The first four questions in the questionnaire are meant to assess the experts' expertise or knowledge regarding the different types of contracts. By means of the literature review, a new definition for the concept of trust in the construction industry has been formulated. The fifth question asks the respondents whether or not they think this definition is suitable to the industry. In question 6, the experts are asked to rank the importance of trust. This may contribute to SQ1.

To address SQ2, question 13 asks the experts to add aspects of trust to the list generated from literature in section 3.3. This question will generate an extensive list of trust aspects. The experts will be asked to offer a brief explanation for each aspect they have listed for trust. The

explanations will serve the dual purpose of providing a qualitative empirical basis for answering the RQ and helps to understand the various experts' opinions. Moreover, the explanations will help to provide clarification for the next questionnaire, which renames and consolidates the list of aspects.

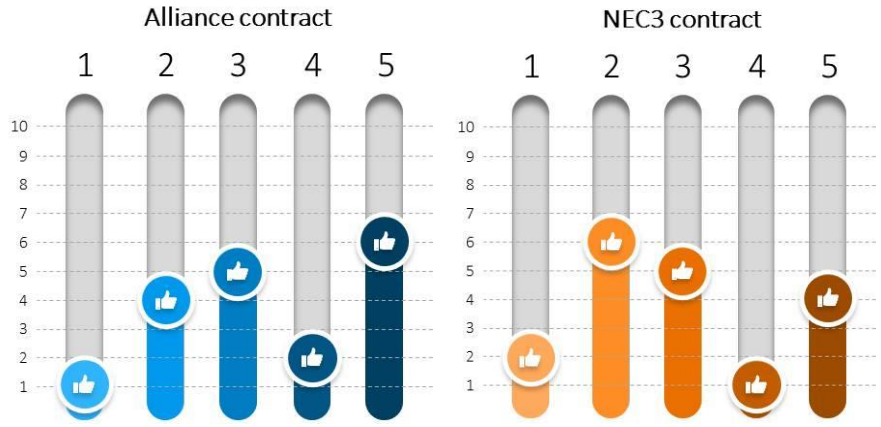
Questions 7 to 12 are meant to contribute to SQ3 and SQ4. The questions relate to the experts' perception of trust in construction projects and how they think trust may influence a projects' success. The experts are asked for examples of good and bad experiences regarding trust in construction projects. They can elaborate on the importance of trust and provide further motivation of their perception of trust in construction projects. By asking for specific examples, the experts are motivated to think more careful about the subject of research.

SQ6 and SQ7 are addressed by asking the experts for their knowledge of control mechanisms in question 14. They are asked to add control mechanisms to the list provided from literature in section 5.1. In the next rounds of the DM, the list will be consolidated and sorted by importance and relevance to contribute further to SQ6, SQ7 and SQ8.

7.1.1 Results of round 1

The first questionnaire was returned by all 18 invited experts. There was no sign of attrition or unwillingness. All open questions have been answered by the expert panel.

Figure 14: Delphi 1.1 and Delphi 1.3: expertise with contracts.

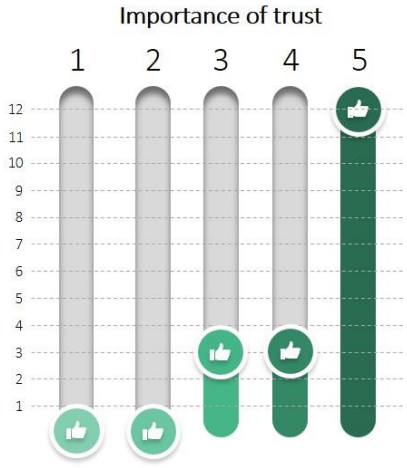


The first questions are meant to get an idea of the level of expertise of the expert panel. The selection of experts already ruled out people with no experience with either AC or NEC3, but not every expert had experience in both contracts. All of the experts have knowledge of UAC-IC 2005 contracts. The results of the first questionnaire made it clear that of the two researched contractual models, the AC is the more common set of conditions, because more experts ranked

their knowledge of the AC higher than their knowledge of the NEC3 contract. These results can be seen in Figure 14. The experts could rank from 1 (no experience) to 5 (much experience), which is seen at the horizontal axis, and the number of experts that gave the rank on the vertical axis.

In the questionnaire, it was asked to comment on the given definition for trust in section 3.1: 'Trust is the willingness of the trustor to risk vulnerability to the trustee, based on the expectation that the trustee will make decisions with positive intentions, without being harmed in the process or the need to control the actions of the trustee.' Most respondents replied positively to this definition, although some found it too difficult and hard to comprehend. According to one expert, "this definition is based on an ideal situation which does not occur very often and might be a utopia; this can however be a good gauge to assess trust in projects." Another expert stated that "trust is not only about the companies, but also about the project and the people working on it. It is about serving each other's interests and the common interest at the same time." Another expert stated that "a decision does not always have to be beneficial, as long as it is reasonable and understandable." Although with some remarks, the definition has been accepted by most experts.

Figure 15: Delphi 1.6: importance of trust in construction projects



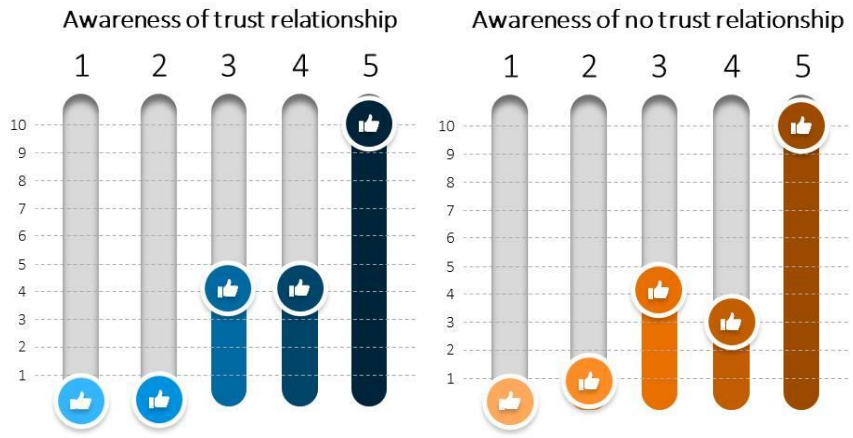
As can be seen in Figure 15, almost every expert found that mutual trust between client and contractor is important to the success of the project. This question was asked to verify the importance of trust within a construction project. This result is in line with the expectation; however, there are some respondents that did not give rank 5 (most important) to the importance of trust. The respondents that replied that trust is not 'very important' were mostly from engineering companies. The reason that those companies do not think trust is very

important, is because they are usually hired as a sub-contractor for a specific goal, and not involved with the actual on-site construction activities.

The respondents from contractors, management companies and client companies that are involved with the works on the actual building site, all state that trust is very important, although some say, “trust does never occur naturally, but has to be build and maintained.”

All the experts are aware of the presence of mutual trust and almost all of them also state that they are aware of the lack of mutual trust when there is no trusting relationship. This implies that trust is required for a good process, because the experts are missing a trust relationship when it is not present and they are aware of a trust relationship when it is. Again, there is no perfect score for this awareness. Most of the experts that have indicated that they are less aware, are the engineers in the expert panel that do not visit the building site as often. Figure 16 illustrates the results.

Figure 16: Delphi 1.8 and Delphi 1.10: awareness of trust relationship



In question 11, it was asked if more attention should be paid to trust building in construction projects. All experts agreed that the incentives regarding trust in UAC-IC 2005 projects are not sufficient and “more attention should be paid to trust building”. The experts state that “trust is required for cooperation” and that “it can make or break a project.” One of the experts states that “the current tendency is that contracts are more and more written into detail. At a certain point this becomes undesirable because it leaves no more room for interpretation and open communication, this can hurt the level of trust between client and contractor.” Some experts also state that we might have lost track of the personal aspects of cooperation, because the contracts are too detailed and strict. It should however not be forgotten that a project must be realised within the time, budget and quality constraints.

The respondents gave their additions to the list of aspects for trust and the list of control mechanisms. By means of multiple choice questions, complete lists have been formed. The complete list of aspects and control mechanisms can be found in Appendix E1. The lists have been consolidated with a threshold of a 40% acceptance rate (Table 18: Delphi 1.13 and 1.14: Consolidated lists for trust and control mechanisms). Some negative outliers have also been included in the consolidated list; this is because literature states they are important and should be evaluated further. It should be mentioned that not many of the experts chose 'formal control of works' to be an important aspect for trust. Only six of the experts chose this aspect. This will be considered in the subsequent questionnaires. The consolidated lists are used for Delphi round two.

Table 18: Delphi 1.13 and 1.14: Consolidated lists for trust and control mechanisms

Aspect of trust	# chosen	% chosen
Experience of the trustee	10	56
Belief in the trustee's quality	9	50
Professionalism of the trustee	17	94
Behaviour of the trustee	11	61
Division of risks and works	9	50
Willingness to cooperate of the trustee	13	72
Reciprocity	8	44
Openness and transparency	6	33
Sharing of information	14	78
Formal control of works	6	33
Responsibility of the trustee	14	78
Honesty of the trustee	16	89
Personal relationship with the trustee	6	33
Reasonable decisions of the trustee	4	22

Control mechanism	# chosen	% chosen
Building inspections	17	94
External supervision	14	78
Rules of conduct	14	78
Risk management	18	100
Construction journal	12	67
Open book accounting	9	50
Project start up	17	94
Early warning duty	15	83
Interim evaluations	16	89
Construction meetings	18	100
Quality assurance	17	94
Informal meetings	4	22
Building reflections	9	50
Dispute boards	14	78
Audits	10	56
Sharing of profits and losses	9	50
Adjudication	7	39

7.2 Round 2

In round two of the Delphi study, the important aspects of trust in construction projects have been further researched. Moreover, the positive and negative effects of control mechanisms on the trust relationship between client and contractor have been researched. The second questionnaire can be found in Appendix F: Delphi Round 2 (Dutch).

By means of the first and third question, the respondents are asked to indicate for each item from the consolidated lists of aspects to what extent they can make a positive or negative contribution to the level of trust between the client and the contractor. By doing so, the importance of each aspect can be determined. This question is used to confirm the literature and may contribute to SQ2 and SQ3.

In question5, it is asked to what extend the different control mechanisms influence a possible trust relationship between client and contractor, either negative or positive. This question is asked to find out which control mechanisms are positively and negatively influencing the construction process and may confirm the findings in the literature study. This is required for SQ6 and SQ7.

The second questionnaire is finished with three questions:

- Indicate (1-5) how important is it that attention is paid to trust between client and contractor through control mechanisms?
- Indicate (1-5) how important it is that the trust between the client and the contractor is discussed informally?
- Indicate (1-5) how important it is that trust is part of a formal contract?

It is especially useful to ask the experts for their motivation of their indication. By means of these questions, contributions can be made to SQ3, SQ6 and SQ8.

7.2.1 Results of round 2

The second questionnaire was sent to all 18 experts that have participated in the first questionnaire. Unfortunately, there were 4 experts who did not respond to the second questionnaire.

In the second questionnaire, the respondents were asked to rate the aspects of trust for their positive and negative effects on the trust relationship between contractor and client. Some aspects might contribute strongly positive to building trust, but they might not harm the trust relationship when they are not present. Those are the extra aspects that are not expected, but can be important. The rating was done from 1 (no effect) to 5 (very big effect). The average scores for questions 1 and 3 are shown in Table 19. For the full scores, see Appendix F: Delphi Round 2 (Dutch).

The table shows that the presence of a certain aspect of trust almost always has a big influence on the trust relationship between client and contractor during a construction project. The aspects that have been chosen the most regarding a positive aspect on trust are honesty, openness and willingness. When there is a lesser trust relationship, the aspects that are missed most by the respondents are willingness, honesty and behaviour. In their motivation, many experts talk about the importance of personality and behaviour. Someone states that “the personal relation is important, although the basis lies with the professional relation”. Three aspects rank higher on the negative-effect ranking than they do on the positive-effect ranking: Behaviour of the trustee, willingness to cooperate and reasonable decisions. This means that the lack of this aspect has a higher negative aspect than the presence of the aspect has a positive effect. The tree aspects all relate to personality and behaviour. This seems to mean that the personal, social aspects of trust are considered more important than the work-related, formal aspects of trust.

Table 19: Delphi 2.1 and Delphi 2.3: average rankings for the effect of trust aspects

Trust aspect	Average rating for positive effect	Average rating for negative effect
Experience of the trustee	3.93	3.64
Belief in the trustee's quality	4.43	3.86
Professionalism of the trustee	4.29	4.07
Behaviour of the trustee	4.14	4.21
Division of risks and works	3.86	3.5
Willingness to cooperate of the trustee	4.5	4.57
Reciprocity	3.64	3.64
Openness and transparency in communication	4.5	4.07
Sharing of information	4.36	3.93
Formal control of works	3.64	3.5
Responsibility of the trustee	4.36	3.79
Honesty of the trustee	4.71	4.29
Personal relationship with the trustee	3.93	3.29
Reasonable decisions of the trustee	3.93	4.07

What is also striking is that the experts have a somewhat neutral opinion regarding formal control of works, whilst it was expected that formal control is deemed more important. The assumption here is that the experts have answered this question with a utopic situation in mind: in a perfect world, no control is needed. This will be researched further in questionnaire 3.

In the second questionnaire, the experts were also asked to indicate what they think the effect of control mechanisms is on the level of trust between a client and contractor during a project.

The experts had to rank each of the control mechanisms from the consolidated list from Delphi round 1. They could rank from 1 to 5, 1 being a very negative effect and 5 being a very positive effect. The average results of the question can be found in Table 20, the complete table can be found in Appendix F1.

Table 20 shows that multiple control mechanisms have been ranked 'important' (big positive effect on trust) on average: a shared budget, interim evaluations, a project start up, open book accounting, informal meetings and risk management. These control mechanisms are of a more informal character and focus on communication. There are no control mechanisms that have a negative effect on the level of trust. The control mechanisms with the least positive effect are ranked around rank 3: Building inspections, external supervision, construction journal, dispute boards, audits and adjudication. The control mechanisms are focused on formal control and direct involvement of the other party.

Table 20: Delphi 2.5: average effect of control mechanisms on trust relationship

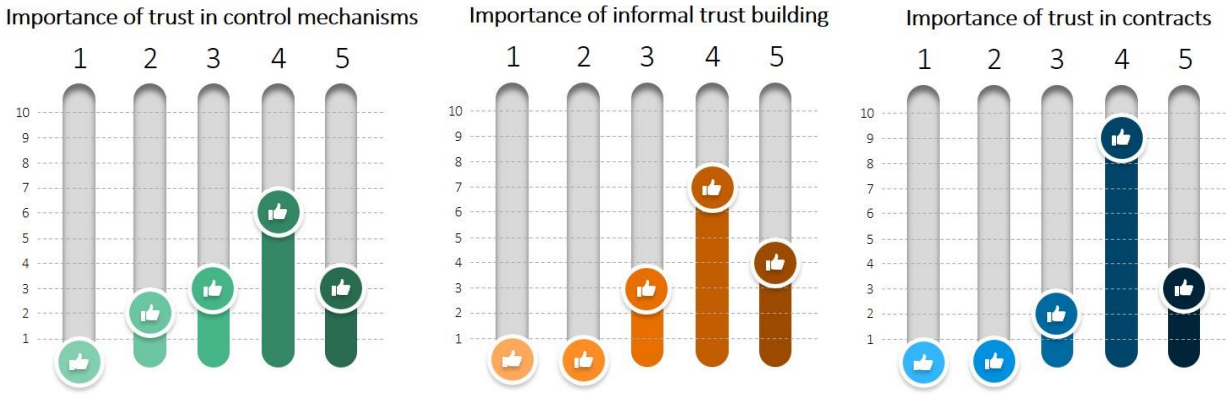
control mechanism	Average effect on trust relationship
Building inspections	3.36
External supervision	3.5
Rules of conduct	3.93
Risk management	4.07
Construction journal	3.29
Open book accounting	4.07
Project start up	4.21
Early warning duty	3.71
Interim evaluations	4.21
Process meetings	3.64
Quality assurance	3.86
Informal meetings	4.07
Building reflections	3.86
Dispute boards	3.21
Audits	3.57
Sharing of profits and losses	4.21
Adjudication	3.5

In the last six questions of this Delphi round, the experts were asked to rank and motivate the importance of trust building in three different ways: in control mechanisms, informal methods or in contracts. Figure 17 shows that trust development with use of control mechanisms is deemed less important than informal trust or trust in contracts.

The question for control mechanisms has more negative outliers, and has a mean of 3,71 for importance, whereas informal trust building and trust in contracts both have a mean of 4,07. This is in accordance with the expectation. However, a description of trust in contracts might involve control mechanisms. This can be contradictory. Delphi round 3 and the interviews will be used to consider this contradiction.

In their elaboration regarding control mechanisms, the experts state that control is important due to the lead time of projects: complex projects simply take up too much time for blind trust. Control mechanisms can also serve as a means for confirmation of willingness and quality, rather than strict control. This could strengthen an already present trust relationship and serve as a safety net in case things do go wrong. It must also be mentioned that experts with a more sceptical opinion say that the person performing the control and the mechanism itself must be trustworthy as well and it should not be affecting the (informal) communication.

Figure 17: Delphi 2.7 and Delphi 2.9 and Delphi 2.11: importance of ways to build trust



Informal attention to the trust relationship is deemed more important than with control mechanisms: more people ranked ‘4’ or ‘5’ and there are no negative rankings. The experts state that “not everything has to be written down in order to cooperate in a project. Some things can also be given to one another unselfishly, without expecting something in return.” Multiple experts state that informal, open, communication and a personal relation of some sort is the basis of a good trust relationship. This can be realised with informal meetings (drinks, events, activities) and teambuilding events and a project start up.

The experts found that it is important to incorporate trust in the contract. However, it might be difficult to write trust explicitly in the contracts, because of the intangible nature. If it can be done this way, trust can have a formal status and be used as a contractual clause as such. This

should not be used to punish the partner, but to refer to if needed. In the end, the people execute the works, not the contract; this should not be forgotten.

7.3 Round 3

In the third round of the Delphi study, the important aspects of trust in construction projects and the effects of control mechanisms are further researched. In this questionnaire, only the 10 highest ranked aspects for trust and control mechanisms from Table 19 and Table 20 in the previous questionnaire have been taken into account. In this final round of questions, the consensus is assessed and has been accepted. The third questionnaire can be found in Appendix G: Delphi Round 3 (Dutch).

In the first two questions, the respondents are asked to sort the top 10 aspects for trust and the top 10 control mechanisms for importance. With this information, the consensus can be assessed and a contribution is made to SQ2 and SQ7. The third question is meant to assess the importance of control mechanisms and confirm the literature review. This contributes to SQ6 and SQ7. The final three open questions are about incorporating trust in contracts. They can contribute to an answer for SQ8.

7.3.1 Results of round 3

The third questionnaire was sent to all 18 experts that have participated in the first questionnaire. Unfortunately, there were 4 experts who did not respond to the second questionnaire. The same respondents that replied to the second questionnaire also responded to the third questionnaire.

The first and second question in this questionnaire is aimed to measure a consensus in the most important aspects of trust in construction projects. With statistical calculations, the mean, mode, range, median, squared deviation and Kendall's W have been calculated. The complete tables with the rankings of the experts can be found in Appendix G1.

The analysis of results of the first question is shown in Table 21. The table shows the trust aspects, the sum of ranks given to the aspect by the experts and other statistical information. The analysis returns that not every aspect has a consensus. However, the calculation of the mean shows the aspects that are considered to be more important than others: honesty of the trustee, openness and transparency and willingness to cooperate. There is also agreement on the least important aspects: formal control of works and sharing of information. A short description of the aspects is provided in Table 22 below.

Table 21: Delphi 3.1: analysis of data

Trust aspect	Total	Mean	Mode	Range	Median	SD	W
Honesty of the trustee	117	8,357	9	7	9	11803,27	0,729948
Openness and transparency in communication	108	7,714	8, 9, 10	6	8	10057,22	0,621968
Willingness to cooperate of the trustee	101	7,214	6	6	7	8795,760	0,543955
Behaviour of the trustee	88	6,285	7	9	7	6677,22	0,412939
Responsibility of the trustee	74	5,285	4	8	4,5	4721,653	0,292000
Belief in the trustee's quality	70	5	5, 6	7	5	4225	0,261286
Reasonable decisions of the trustee	70	5	5	9	5	4225	0,261286
Personal relationship with the trustee	60	4,285	2	8	3,5	3104,081	0,191965
Sharing of information	50	3,571	3	5	3	2155,61	0,133309
Formal control of works	32	2,285	1	4	2	882,938	0,054603

Table 22: description of aspects of trust

Aspect of trust	Description
Honesty of the trustee	Honesty is about telling the truth and acting accordingly.
Openness and transparency in communication	Both the trustor and the trustee should communicate openly with each other.
Willingness to cooperate of the trustee	Willingness to cooperate regards the intrinsic motivation of the trustee to do the work.
Behaviour of the trustee	Behaviour of the trustee is a combination of skills (communication, politeness, attitude, etc.) that, as an aspect for trust, affects the gut feeling of the trustor.
Responsibility of the trustee	Whether or not the trustee takes his responsibility during the project when needed.
Belief in the trustee's quality	The belief that the trustor has in the amount of experience and professional attitude of the trustee. Whether or not the trustee has proven to be able to do the work.
Reasonable decisions of the trustee	The trustee makes decisions that are reasonable for the trustor or the project and not self-centred.
Personal relationship with the trustee	The effect of formal control on the relationship between trustor and trustee.
Sharing of information	Both the trustor and the trustee share the information they have regarding the project with each other.
Formal control of works	The work may be controlled and checked by another person or by means of a control mechanism

Table 23 shows the analysis of the second question. In this question, the experts had to sort the control mechanisms in order of the level of effect on a trust relation between client and contractor. The control mechanisms were described in section 5.2. As can be seen in the table, the ranges of nearly all control mechanisms are large, meaning that there is no good consensus amongst the experts. However, a list of importance has been formed on the basis of the mean and Kendall's W. Striking is that the informal control mechanisms (PSU, Informal meetings) are considered more important. What's also striking is that process meetings are considered least important, while they might be the most often used control mechanism in the industry.

Table 23: Delphi 3.2: analysis of data

Control mechanisms	Total	Mean	Mode	Range	Median	SD	W
Project start up	107	7,642857143	10	6	8	9871,841837	0,610503515
Open book accounting	97	6,928571429	9	7	7	8112,862245	0,501723083
Informal meetings	92	6,571428571	7	9	7	7298,040816	0,451332147
Risk management	83	5,928571429	4	8	6	5940,005102	0,367347254
Quality assurance	69	4,928571429	3	8	5	4105,147959	0,253874333
Interim evaluations	68	4,857142857	1, 6, 8	8	5,5	3987,020408	0,24656898
Sharing of profits and losses	67	4,785714286	1	9	4,5	3870,617347	0,239370275
Rules of conduct	67	4,785714286	3	9	4	3870,617347	0,239370275
Early warning duty	63	4,5	1, 2	9	3,5	3422,25	0,211641929
Process meetings	57	4,071428571	2	8	4	2801,433673	0,173248836

In their motivation, the experts give several interesting explanations for their choice of the top 3 mechanisms. Almost every expert makes notice of the importance of communication in a project. It is important that there is a low threshold for communication and that people are easy to reach at any time during the project. Several experts state that the PSU is a good way to establish boundaries and rules for behaviour and communication from the start.

Three experts mention risk management is important to maintain a good trust relation during the project. It can also be used as a tool to guide opportunities rather than solve problems. This positive approach may benefit the trust relationship. Some of the experts mention that "a financial stimulus can also improve the trust relationship between client and contractor." They say that "extra attention should go to control mechanisms that facilitate this financial stimulus. Shared profits and losses, open book accounting and an early warning system can contribute to this approach."

In this last Delphi round, the experts all agree that trust should be incorporated in integrated contracts. However, some of the experts think that formulating the concept of trust might be a difficulty. The majority of experts state that the way NEC3 does this, might be the best way to go: “explicitly state trust in the contract and generate broad support by adding several control mechanisms that support trust.” Cooperation should be the core of the contract. This will be validated by means of the interviews

According to the experts, upon incorporating trust in contracts, cooperation amongst client and contractors in construction projects is considered to be better than a contract without trust. There will be more attention for the ‘soft’ side of the construction industry: more personal attention and a better understanding of each other’s goals and targets. In the end, the experts think that this might result in cost reduction and a better relationship with construction partners for future projects.

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8. Conclusions

In this chapter, all sub-questions (SQ) will be answered in section 8.1, followed by the answer to the main research question (RQ) in section 8.2. The objective of this qualitative research is to determine how mutual trust between client and contractor can be incorporated in integrated contracts for complex building projects. Other goals for this research are: to determine the importance of trust in building projects, find out how the concept of trust can be best described in construction contracts or administrative conditions and issue an advice on which control mechanisms positively influence building projects. The outcome of this research can be used to improve future cooperation between construction companies with contracts that meet the needs of the current construction industry in the Netherlands.

One main research question and eight sub-questions were formulated. In order to form conclusions for all questions, a literature review has been done, interviews have been held with experts that have worked on two successful complex construction projects and surveys have been conducted by means of a Delphi study. The information and data from all three research methods has been analysed and compared in order to answers the questions.

8.1 Sub questions

This section will provide a comparison of the results from the literature review, the interviews and the Delphi study, in order to answer the sub questions. This comparison will be the basis for the conclusion for the main research question, which will be presented in section 8.2. The comparison of the results from the different research methods will be made for every sub question from section 1.4; section 8.1.1 provides a table to summarize all SQ's.

SQ1 *How can trust be defined in context of the construction industry?*

It was found that the previous definitions from literature did not suffice for the construction industry, because not all of the different factors for trust in the construction industry were incorporated in previous definitions: belief, decision, action, risk and benefits and it must cover both rational and psychological aspects. A new definition has been formulated to support the concept of trust in construction projects: Trust is the willingness of the trustor to risk vulnerability to the trustee, based on the expectation that the trustee will make decisions with positive intentions, without being harmed in the process or the need to control the actions of the trustee.

By a means of the Delphi method (chapter 7), this definition was confirmed. However, there were some remarks: The definition is too formal and therefore it can be difficult to comprehend. This argument was countered by another expert, who said that the definition is

all-encompassing and could therefore be used to assess trust in projects. Comparing the results, this research has found that generally, the new definition of trust will suffice for the construction industry.

In the interviews, the interviewees were asked to give their own definition of trust. The interviewees all gave more or less the same answer, although with different emphases: trust is a combination of aspects that are required for good cooperation and communication in a construction project. This is also found in the new definition for trust from this research.

SQ2 Which aspects of trust are important in a construction project?

To answer this SQ, the literature review and the DM have been used. By means of the literature review, trust has been broken down. Due to its intangible nature, trust consists of many different aspects, which can be divided into four qualities and three types. The three different types of trust are: system-based trust, cognition-based trust and affect-based trust. The four different qualities are: ability, integrity, predictability and benevolence. This research shows that benevolence is considered to be the most important quality; cognition-based trust and affect-based trust are considered the most important types of trust for cooperation in construction projects. Cognition-based trust is important, because it reflects a trustee's ability to communicate and share information; affect-based trust arises from personal relationship and feelings. It can be concluded from the literature review that informal aspects of trust are most important.

By means of the Delphi study amongst 18 experts from the construction industry, the most important aspects of trust have been found: honesty, openness and transparency in communication, willingness to cooperate and behaviour. Most of the important aspects relate to communication and personality of the trustee. This research has shown that the informal relationship between the client and contractor is important to maintain a high level of trust. The least important aspects of trust according to the experts are formal control of work and sharing of information; these aspects relate to system-based trust.

SQ3 How does the level of trust between client and contractor influence project success?

From the start of this research, it was expected that a high level of trust between client and contractor would be beneficial to the projects' success. This research has confirmed this hypothesis by means of the literature review and experts' opinions in interviews and the DM. Figure 15 and Figure 17 in section 7.1 show that the respondents to the Delphi survey are nearly unanimous about the importance of trust. However, a distinction can be made between the different respondents. Amongst the respondents there were architects and construction

engineers, who regarded the importance of trust in projects lower than the mangers from the client and contractor. It is expected that this is related to the fact that the engineers have a bigger distance to the actual realization of the project.

The literature review shows that the importance of trust in general is reflected in cooperation and communication during the project. A low level of trust is one of the main reasons for conflicts and defects. It is suggested that trust helps to reinforce e.g. willingness, confidence, expectation, belief, behaviour and to overcome risk and uncertainty on the personal level. Furthermore, trust reduces harmful conflict, reduces costs and promotes effective responses to occurring defects. This was confirmed with the DM and the interviews.

SQ4 How do stakeholders perceive trust in current construction projects governed by UAC-IC 2005 contracts?

By means of the literature review, it was found that the current trust building processes in projects that are governed by UAC-IC 2005 contracts is insufficient. The interviewees and respondents in the DM confirmed and elaborated on this. They state that there are too many intermediate steps in communication, too many different stakeholders and no flexibility in the contracts. It was also found that the UAC-IC 2005 does not give enough incentives to communicate openly and honestly, or cooperate with the best intentions for the project.

A major finding is that most UAC-IC 2005 contracts are based on a situation in which two or more parties are opposite to each other in the pre-contractual phase, writing a contract without regarding each other's interests. Client and contractor are separate and have different goals for the project, leading to conflict and mistrust rather than trust and cooperation. This research has shown that if the basis of a project (personal relation and contract) does not radiate trust, then the project itself will never be performed with a high level of trust. The current tendency in the construction industry counters this: the construction industry wants a situation in which companies can build trust and cooperate with aligned interests. Experts would like to see changes made to regular integrated contracts in order to be able to focus on trust in building projects. According to literature and the interviewees, focussing on building trust can be done in several ways: using control mechanisms, using the contract or with informal methods.

SQ5 How is trust described in the alliance contract and the NEC3-ECC contract?

The results of this research show that the AC and the NEC3-ECC provide some of the needs of the industry for a contract with a basis for trust and cooperation at the core of the contracts. The findings in the literature review have been substantiated with the DM and interviews. The concept of trust is reflected in the contracts in the following way:

- The NEC3 has a clause (10.1) explicitly mentioning trust. The AC does not cover trust explicitly. Taking up a clause explicitly mentioning trust in a contract, can help to align the interests of the stakeholders; it can also be used as a means to terminate the contract, providing an incentive to build trust rather than conflict.
- The NEC3-ECC target cost contract has a painshare / gainshare model written in the contract. This is a financial incentive to cooperate and thereby motivates trust as well.
- The NEC3-ECC and the AC have the possibility to apply several control mechanisms to support trust building. Most control mechanisms are focussed on formal control of the works, however, control mechanisms that focus on cooperation and communication can be beneficial to trust building.
- With the Isala project, much effort was put in building trust in the pre-contractual phase by means of informal mechanisms like the project start up and teambuilding activities. It is required for stakeholders to know each other in order for trust to arise.
- Both the NEC3 and WIU contracts are written in plain language rather than difficult legal language, making it more practical and readable.

SQ6 How do control mechanisms influence the level of trust between client and contractor?

Control mechanisms are project management tools that can be used to structure and control specific parts of the process. For instance: managing project planning, managing budgets and managing the required quality. This research has identified that because of its intangible nature, it can be difficult to come to likeminded agreements about trust with another party when parties do not have established a personal relationship in the per-contractual phase. However, the level of trust can be positively influenced during the project by means of control mechanisms. In order to do this, the parties should agree on which control mechanisms to use during the project and how to execute them.

The effect of the application of control mechanisms can be either negative or positive. This research shows that a negative effect can originate from:

- Bad application of the control mechanism.
- Untrustworthy controllers executing the control mechanism.
- Bad communication and agreements about the method and consequences of control.
- Negative feedback from the control mechanism.

Positive effects of control mechanisms can originate from:

- Good communication due to control mechanisms.
- Confirmation of willingness and quality.
- Incentives and rewards that arise from the use of control mechanisms.

In a utopic situation, control mechanisms are considered to be unnecessary. However, the respondents to the DM believe that control mechanisms and contracts are required to act as a safeguard for the client or contractor and should therefore be used to build trust as well. These findings have been confirmed in the interviews.

SQ7 Which control mechanisms are beneficial to the trust relationship in construction projects?

By means of the literature review and the interviews, it has been shown that some control mechanisms are beneficial to the trust relationship between client and contractor: the control mechanisms that are more focused on providing safety and certainty for the client or contractor. It was found that control mechanisms with financial incentives are beneficial to the trust relationship. DM has shown that none of the control mechanisms that were a part of the research had a negative effect on the level of trust, although the mechanisms are not always desirable. This could indicate that control is general is deemed necessary to build a trust relationship in construction projects, or that none of the experts has ever experienced a negative effect of one of the control mechanisms, which was not the case.

By means of the Delphi method, a list of more important control mechanisms has been formed. The informal control mechanisms project start-up, informal meetings and code of conduct are considered to be important by the expert panel. According to literature and interviews, the control mechanisms open book accounting, risk management, adjudication and early warning system are considered beneficial. It is striking that the result of the DM showed that general process meetings are considered least important to build trust, although they are the most common control mechanism in the construction industry.

It can be concluded that a high level of trust can only be reached from a basis of a personal relationship. This basis can be established using informal mechanisms in the pre-contractual phase and during the realisation of the project. During the project, the parties require formal control mechanisms for comfort and safety. The formal control mechanisms that are applied for this reason should also strengthen the level of trust and give incentives for cooperation. This research shows that the following formal and informal control mechanisms are considered to be most beneficial (random order): painshare/gainshare, open book accounting, early warning system, project start up, code of conduct and adjudication.

SQ8 How can trust best be described in a contract or in administrative conditions?

A combination of contract, formal control mechanisms and informal methods is favoured. This study has found that explicitly stating trust in a contract and generate broad support with control mechanisms is most beneficial for the level of trust.

A clause explicitly stating trust, like in the NEC3 conditions, is needed to create a specific mindset with all stakeholders and to make trust a binding factor in the contract. Other articles in the contract should also provide flexible support for a trust relationship between client and contractor: emphasis on communication, cooperation and stakeholder bahaviour. Certain control mechanisms, like a code of conduct, the painshare / gainshare model, open book accounting and an early warning system can help to achieve this in practice. They should be managed and executed by trustworthy people as well and the rules and regulation regarding those control mechanisms should be righteous and fair to all parties.

All results show that the contract is considered less important than the cooperation of the people involved and their mutual trust. Therefore, in the pre-contractual phase and in the contract extra attention should be paid to the people involved and their personal relation. Informal control mechanisms can provide comfort to this process.

8.1.1 Overview of comparison

The answers to the SQs from the previous section have been summarized and put into one table:

Table 24: Comparison of methods

Literature	Delphi study	Interviews
SQ1: How can trust be defined in context of the construction industry?		
'Trust is the willingness of the trustor to risk vulnerability to the trustee, based on the expectation that the trustee will make decisions with positive intentions, without being harmed in the process or the need to control the actions of the trustee.	Trust is a combination of factors that facilitate good cooperation. The definition from literature is confirmed.	Trust consists of: e.g. aligned interests, honesty, being able to benefit from each other, have open communication and rely on each other.
SQ2: Which aspects of trust are important in a construction project?		
Trust can be broken down into many different aspects, four different qualities (ability, benevolence, integrity, predictability) and three different types (system-based, cognition-based, affect-based).	The most important aspects of trust are honesty, openness and transparency, willingness to cooperate and behaviour. The least important aspect is formal control of trust.	The interviewees emphasize that people have to know each other in order to be able to trust each other, therefore the informal aspects are most important
SQ3: How does the level of trust between client and contractor influence project success?		
A trusting environment will motivate cost reduction and innovation and it is required for communication and cooperation.	Trust is required for a successful project, because it influences communication and cooperation.	Trust Is the basis for good cooperation. It can help to smoothen processes and communication and it will reduce costs.

SQ4: How do stakeholders perceive trust in current construction projects governed by UAC-IC 2005 contracts?		
Literature names several shortcomings of the current UAC-IC 2005. The current tendency is that more flexible contracts and open communication is required to regain trust in construction projects.	Trust is required for successful projects; the current regular contracts do not suffice and are based on mistrust rather than trust.	Most projects are bases on conflicts and mistrust. The case projects were examples of projects in which a lot of effort was put into trust building and resulted in successful projects.
SQ5: How is trust described in the alliance contract and the NEC3-ECC contract?		
NEC3: Article 10.1 explicitly states trust and it is backed by all other clauses and control mechanisms. NEC3 is written in plain language rather than juridical jargon. AC: Focus on cooperation and communication. Supported by control mechanisms and flexibility.		An explicit clause for trust, supported by financial incentives and (in)formal control mechanisms.
SQ6: How do control mechanisms influence the level of trust between client and contractor?		
Control mechanisms can be beneficial to the level of trust, when executed correctly and using the right type of control for each situation.	The control mechanisms in this research are never negative for the level of trust between client and contractor. Application, agreements and communication can influence the level of trust.	Control and trust contradict each other, but control is needed to enforce the trust relation and provide a safeguard. The influence of the control mechanisms depends on the person executing the control and the type of control. Control mechanisms can confirm or deprive a stakeholder's trustworthiness.
SQ7: Which control mechanisms are beneficial to the trust relationship in construction projects?		
Every control mechanisms can be both beneficial and negative to the trust relationship, depending on execution. Literature states that some control mechanisms can be more beneficial than others. The importance of informal control is emphasized.	The most beneficial control mechanisms are informal control mechanisms like project start-up, Informal meetings and a code of conduct. The informal control mechanisms are deemed necessary for getting to know each other and communication.	Control mechanisms can function as a safeguard and motivation. Formal control mechanisms are required. Financial incentives, in combination with good communication are deemed best for maintaining trust. Control mechanisms like open book accounting, early warning system, adjudication and risk management are most suited for this purpose.
SQ8: How can trust best be described in a contract or administrative conditions?		
Combination of formal contract clauses explicitly stating trust, incentive control mechanisms and informal attention to the personal trust relationship.	Explicitly state trust and support it with the rest of the contract by means other clauses and control mechanisms.	Cooperation should be the main focus of the contract. The contract should provide flexibility and be practical. The contract is considered less important than the cooperation of the people involved

8.2 Research question

The main research question has been formulated as follows: 'How can mutual trust between client and contractor be incorporated in integrated contracts?'

This research has shown that a combination of an explicit mention of trust in a contract clause, formal control mechanisms and informal control mechanisms is favoured. The contract is used to create a mindset and align interests between the client and contractor in an integrated contract; the control mechanisms are used to build a personal relationship, strengthen the level of trust and provide a certain comfort and safety in the project.

In this research, trust has been defined as the willingness of the trustor to risk vulnerability to the trustee, based on the expectation that the trustee will make decisions with positive intentions, without being harmed in the process or the need to control the actions of the trustee. The integrated contract or its administrative conditions should mention that the stakeholders must act in the spirit of mutual trust, as described by this definition.

It is desirable to incorporate control mechanisms that support trust building in a project. Trust originates from a relationship between the trustor and the trustee, meaning that in order to build a trust relationship, attention should be paid to affect-based trust. Companies and people working together on the project should act honestly and communicate open and straight, not withholding any information and act in the interest of the project rather than self-centred. This can be supported by a code of conduct for a project, which can be agreed upon in the pre-contractual phase. Moreover, the project start-up should be used to build the basis of trust for the entire project by getting to know each other.

Formal control mechanisms are required for comfort and safety of all stakeholders. They should be focussed on communication, financial incentives and alignment of interests: open book accounting will urge the stakeholders to be open and honest in the process; an early warning system and good risk- or opportunity management will make sure that faults and defects are solved before they can harm the relationship; the involvement of an adjudicator will prevent conflicts to arise; a financial painshare / gainshare model will motivate close cooperation and can also reduce the costs and planning.

Furthermore, the contract should be flexible in its application and choice of provisions and control mechanisms. The language should be clear to improve practicality of the contract.

9. Discussion

This chapter is the discussion of the thesis. Section 9.1 elaborates on the scientific contribution and implications of this research. In section 9.2, the research limitations are discussed.

9.1 Scientific contribution and implication of research

This research is a combination of different subjects from different fields of research. The research combines topics from technical, social, psychological, philosophical and juridical fields of research in the context of the construction industry. By means of this research, a contribution has been made to the research gap mentioned in section 1.2. However, more research is required to completely fill the gap. Suggestions for future research are provided in chapter 10.

This research extends general knowledge of the importance of trust in complex building projects governed by integrated contracts in the Netherlands. The study enhances understanding of the influence of control mechanisms on the level of trust between client and contractor and the influence of trust on cooperation and project success.

This study has confirmed findings from previous research regarding trust and contracts in the construction industry. However, this is one of the first studies that involves experts' opinions on the field of trust in the construction industry. They have been able to speak freely and their needs are translated into suggestions for future integrated contracts. The findings of this study can be used to formulate a new set of administrative conditions for integrated contracts or update the current UAC-IC 2005. The research provides handles and guidelines on how to incorporate the concept of trust in contracts that can be generalized for every complex integrated project.

The analysis of the Delphi method has extended general knowledge regarding some of the most important beneficial control mechanisms for building a trust relationship between client and contractor. This research can serve as a basis for future studies in the field of research.

The research contributes to research into the construction industry regarding complex building projects, rather than infrastructure projects. Not much research has been conducted towards integrated contracts with building projects rather than infrastructure projects.

9.2 Limitations of the research

This section will cover the limitations of this research. The limitations that are discussed in this section cover the limitations to the scope of this research and the limitations to the research methods.

First of all, this is a qualitative and exploratory research, combining different fields of research. Due to the nature of this research and the intangible concept of trust, this study was limited by the availability of factual data concerning trust. The conclusions of this research are based on the opinions of experts from practice and literature. Furthermore, at this time, only one project has been carried out governed by a NEC3 contract in the Netherlands; there are not much experts regarding NEC3 in the Netherlands. A bigger expert panel and more factual data regarding trust and the NEC3 contracts in the Netherlands may lead to a stronger foundation for the conclusions.

Furthermore, a limitation of this study is that the research may not be generalised to every project. This research focuses on complex building projects in the Netherlands only, although the concept of trust may differ in every situation or culture. The results of this research might therefore be different in another country or with another type of project. Also, the contract models that were a part of this research are the NEC3 and the AC. They have been used as a basis for the conclusions. A comparison of other contracts may have a different result.

Thirdly, the research can have biased results for multiple reasons:

- Experts that were interviewed for the case projects have also participated in the Delphi method. Comparing the results of the Delphi study to the information from the interviews can therefore have been biased. However, it was clearly stated that the questions in the Delphi survey were intended for an ideal situation, and not in respect to actual projects.
- The interviews were held on two case projects that were both successful projects. More data on different projects will have to be gathered and analysed in order to prevent a biased research.
- The expert panel for the Delphi study was subject to attrition and non-response issues. The first round was responded to by 18 respondents, while the second and third rounds were only filled out by 14 experts.
- The interviews were held with different people from both client and contractor side in the projects, however, interviews with consulting engineers or architects are lacking and may have provided extra information and a different point of view.

Fourth, the scope of this research was limited to the control mechanisms that are commonly used in the NEC3 and AC sets of conditions. However, there are many more control mechanisms then the ones that have been a part of this research. In order to provide a broader, all-encompassing advice on which control mechanisms to use, more control mechanisms should be researched.

10. Recommendations

In this chapter, the recommendations for future research are elaborated.

Due to the limited scope and time of this research, the subject of this research has not yet been studied to its full extend. Therefore, the following subjects are proposed for further research:

- The results of this research might also be applicable to traditional contracts or administrative conditions. This can be further researched for a more general conclusion.
- More different contracts can be compared for a complete picture of trust building processes and tools in contracts. For instance, UAC 2012, FIDIC and Principles of European Law – Service Contracts could be compared to the contracts in this research.
- A more intensive comparison should be done with the UAC-IC 2005. Doing more interviews and case studies for this set of conditions can be a useful addition to this research.
- More different control mechanisms should be researched to point out more beneficial mechanisms for building trust. This research has not covered every possible control mechanism.
- The results of this research can be put into the context of co-creation and co-ownership. The concept of trust in co-creation and co-ownership projects, or partnering projects can be researched in the future.
- This research has focussed on the beneficial aspects for trust in the NEC3 and AC. It may also be interesting to know the negative parts of the contracts. The reason why the contracts are not used more often in building projects in the Netherlands is unclear. This can be studied further in future research.
- This research showed that engineers and managers have a different opinion regarding the importance of trust in projects. Research towards this difference in opinion may provide more insight and can be applied to future contracts as well.
- More research is required to determine how general process meetings could contribute more to the trust relationship.

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Appendix A: List of figures, tables and abbreviations

List of figures

List of tables

List of abbreviations

AC	-	Alliance contract
CE	-	Compensation Event
DCC	-	Dutch Civil Code
DM	-	Delphi Method
EA	-	Evaluations and Assessments
EWS	-	Early Warning System
ICC	-	International Criminal Court (case project)
IH	-	Isala Hospital (case project)
KRNW	-	Knowledge Resource Nomination Worksheet
MBA	-	Model Basic Agreement
NEC	-	New Engineering Contract 1st edition
NEC2	-	New Engineering Contract 2rd edition
NEC3	-	New Engineering Contract 3rd edition
NEC3-ECC	-	New Engineering Contract 3rd edition – Engineering and Construction Contract
OBA	-	Open Book Accounting
PSU	-	Project Start-Up
RR	-	Risk Register
RQ	-	Research question
SQ	-	Sub question
SW	-	Supervision of Work
TNR	-	The New Regulations (Dutch: De Nieuwe Regeling)
UAC	-	Uniform Administrative Conditions
UAC-IC	-	Uniform Administrative Conditions for Integrated Contracts
WIU	-	Werk in uitvoering contract

Appendix B: Comparison between a traditional and a Delphi Survey

The table below shows a comparison between a traditional survey and a Delphi survey, based on the comparison done by (Okoli & Palowski, 2004).

Table 25: comparison of a traditional survey and a Delphi survey (Okoli & Palowski, 2004)

Evaluation criteria	Traditional survey	Delphi study
Summary of procedure	The researchers design a questionnaire with questions relevant to the issue of study. There are numerous issues concerning validity of the questions they must consider developing a good survey. The questionnaire can include questions that solicit quantitative or qualitative data, or both. The researchers decide on the population that the hypotheses apply to, and selects a random sample of this population on whom to administer the survey. The respondents fill out the survey and return it. The researchers then analyze the usable responses to investigate the research questions.	After the researchers design the questionnaire, they select an appropriate group of experts who are qualified to answer the questions. The researchers then administer the survey and analyze the responses. Next, they design another survey based on the responses to the first one and re-administer it, asking respondents to revise their original responses and/or answer other questions based on group feedback from the first survey. The researchers reiterate this process until the respondents reach a satisfactory degree of consensus. The respondents are kept anonymous to each other throughout the process.
Representativeness of sample	Using statistical sampling techniques, the researchers randomly select a sample that is representative of the population of interest.	The questions that a Delphi study investigates are those of high uncertainty and speculation. A Delphi study is a virtual panel of experts gathered to arrive at an answer to a difficult question.
Sample size for statistical power and significant findings	The researchers need to select a sample size that is large enough to detect statistically significant effects in the population. Power analysis is required to determine an appropriate sample size.	The Delphi group size does not depend on statistical power, but rather on group dynamics for arriving at consensus among experts. Thus, the literature recommends 10–18 experts on a Delphi panel.
Individual vs. group response	The researchers average out individuals' responses to determine the average response for the sample, which they generalize to the relevant population.	Studies have shown that for questions requiring expert judgment, the average of individual responses is inferior to the averages produced by group processes; research has explicitly shown that the Delphi method bears this out.
Construct validity	Construct validity is assured by careful survey design and by pretesting.	The Delphi method can employ further construct validation by asking experts to validate the researcher's interpretation and categorization of the variables.
Anonymity	Respondents are almost always anonymous to each other, and often anonymous to the researcher.	Respondents are always anonymous to each other, but never anonymous to the researcher.
Attrition and Non-response issues	For single surveys, attrition (participant drop-out) is a non-issue. For multi-step repeated survey studies, researchers should investigate attrition to assure that it is random and non-systematic.	Non-response is typically very low in Delphi surveys, since most researchers have personally obtained assurances of participation.
Richness of data	The richness of data depends on the depth of the questions, and on the possibility of follow-up, such as interviews.	Delphi studies inherently provide richer data because of their multiple iterations and their response revision due to feedback.

Appendix C: Maturity Model of relationships in construction projects

Table 26: Maturity Model of relationships in construction projects (Meng et al., 2011)

Main criteria	Sub criteria	Level 1: Price competition	Level 2: Quality competition	Level 3: Project partnering	Level 4: Strategic partnering / Alliance
Procurement	Selection criteria	The lowest price	Cost and quality	Multi-criteria from short-term perspective	Multi-criteria from long-term perspective
	Procurement route	Single-stage tendering	Two-stage tendering	Negotiation or tendering	Direct negotiation
	Form of contract	JCT	JCT/NEC	NEC/PP 2000/JCT CE	MEC/TPC 2005/JCT CE/Bespoke contract
Objective	Objectives alignment	Only self-objectives	Mainly self-objectives	Mutual objectives in a project	Mutual objectives in the long-term
	Benefits	Win-Lose	Win-Partial Win	Win-Win in a single project	Win-Win in the long-term
	Continuity of work	No continuity of work	Prospect of future work through tendering	Preferred suppliers	Guarantee for future work
Trust	Type of trust	Contractual trust	Competence trust	Short-term goodwill trust	Long-term goodwill trust
	Confidence in others' behaviour	Little confidence	Some confidence	Much confidence	Full confidence
	Monitoring others' work	Checking and double checking	Checking somewhat reduced	Checking greatly reduced	Checking almost unnecessary
Collaboration	Working relationship	Confrontation or arm's length	Limited cooperation	Collaboration	Close collaboration
	Mutual help	No support for the weaker	Support only with the issues related to self-interest	Often support for a weak partner	Always support for a weak partner
	Culture	Mutual blame	Self defence	Abandon of blame culture	Problem solving focused culture
Communication	Information exchange	Little information is exchanged openly	Some information is exchanged openly	Much information is exchanged openly	Most information is exchanged openly
	Cost data transparency	No cost transparency	Little cost transparency	Open book costing between two parties	Open book costing throughout the whole chain
	Sharing learning	No sharing learning and innovation	Little sharing learning and innovation	Sharing learning and innovation	Continuous sharing learning and innovation
Problem Solving	Early warning	No risk identification, no early warning	Informal risk identification, no early warning	Early warning between two parties	Early warning throughout the whole chain
	Avoidance of recurrence	Problems often recur	Sometimes problems recur	Few problems are repeated	Rare problems are repeated
	Effectiveness	Problems often lead to disputes	Problems sometimes lead to disputes	Many problems are timely resolved at the lowest level	Most problems are timely resolved at the lowest level
Risk allocation	Risk sharing	No risk sharing	Limited risk sharing	Risk sharing greatly increased	Common practice for risk sharing
	Allocation principle	Risk is always allocated to the weak party	Risk is often allocated to the weak party	Risk is allocated to the party best able to manage it in a project	Risk is allocated to the party best able to manage it in the long-term
	Balance of risk and reward	No rewards for the party taking the risk	Some rewards for the party taking the risk	Often appropriate rewards for the party taking the risk	Always appropriate rewards for the party taking the risk
Continuous Improvement	Joint effort	No joint effort for improvement	Limited joint effort for improvement	Joint effort for better ways of working	Continuous effort for better ways of working
	Performance measurement and feedback	No common measures; No formal feedback	Limited common measures; Irregular but formal feedback	Common measures; Regular and formal feedback in a project	Common measures; Formal, regular and continuous feedback
	Incentives	No incentive	Informal incentive	Single incentive	Multiple incentives

Appendix D: Selection of experts

For reasons of anonymity, the names and contact information of the experts involved has been censored.

Table 27: Knowledge Resource Nomination Worksheet

#	Project	Name	Company	Nominated by	Contact information
1	Isala	X	D2B Isala	M.A.B. Chao-Duivis	X
2	ICC	X	Kontek / Brink Groep		X
3	-	X	Procap	X (BOAG)	X
4	-	X	BOAG / Rafaelstichting	X (BOAG)	X
5	ICC	X	Brink Management & Advies	P. Fondse (Brink Groep)	X
6	ICC	X	To Interface		X
7	Isala	X	D2B Isala	R. Polinder (BAM)	X
8	Isala	X	BAM / D2B Isala		X
9	-	X	Twynstra Gudde		X
10	Isala	X	Twynstra Gudde		X
11	Isala	X	Alberts & van Huut International Architects		X
12	Isala	X	Stevens & Van Dijck	R.Polinder (BAM)	X
13	-	X	Stevens & Van Dijck	R.Polinder (BAM)	X
14	ICC	X	Pieters Bouwtechniek		X
15	-	X	Ingenieursbureau Verhoeven & Leenders		X
16	-	X	Bartels	X (Bartels)	X
17	ICC	X	Brink Groep	M. Meulebeek (Brink Groep)	X
18	ICC	X	Courtys		X

Appendix E: Delphi Round 1 (Dutch)

Beste respondent,

Hartelijk dank voor uw deelname aan dit onderzoek. Het totale onderzoek behelst enkele vragenlijsten. Met behulp van de vragenlijsten wordt toegewerkt naar een consensus in een panel van experts en ervaringsdeskundigen, waar u onderdeel van bent.

De afgelopen decennia heeft de bouwwereld ervaren dat de contracten die worden toegepast in de Nederlandse bouwindustrie blijven veranderen. In een industrie waarin veel verschillende bedrijven met verschillende expertises samen aan projecten werken, is er behoefte aan goede afstemming. Geïntegreerde contractvormen, zoals het *Alliantie Contract* en het *Engineering and Construction Contract* (NEC3-ECC) kunnen uitkomst bieden. Zaken als communicatie, risicoverdeling, winstdeling, delen van informatie, planningen en verschillende controlemechanismen spelen een belangrijke rol in de bouw. Wederzijds vertrouwen kan hierin ook een rol spelen. Dit onderzoek gaat over vertrouwen in de bouw, of en hoe het opgenomen kan worden in deze contractvormen, en wat de invloed is van controlemechanismen op het vertrouwen.

De hoofdvraag die ik met mijn onderzoek zal onderzoeken is: “Hoe beïnvloedt het wederzijds vertrouwen tussen opdrachtgever en opdrachtnemer een bouwproject dat wordt uitgevoerd met een Alliantie of NEC3-ECC contract?”, met onder andere de sub-vragen “Wat is vertrouwen”, “Is wederzijds vertrouwen belangrijk?” en “Welke controlemechanismen hebben een positief effect op het bouwproces?”.

Het onderzoek bevat in totaal drie of vier verschillende vragenlijsten. Het doel is om elke week een nieuwe vragenlijst te versturen, wat alleen mogelijk is als elke respondent zijn/haar vragenlijst tijdig heeft ingevuld. De eerste vragenlijst is een verkennende vragenlijst. De vragen zullen met elke vragenlijst specifieker worden. De vragenlijsten zullen niet meer dan 10 minuten van uw tijd in beslag nemen en zullen bijdragen aan het succes van dit onderzoek en mijn afstudeerscriptie.

U bent geselecteerd voor deelname aan dit onderzoek op basis van uw professionele expertise en werkervaring. Al uw antwoorden blijven volledig anoniem voor de andere respondenten. De analyse van de antwoorden wordt gepubliceerd in mijn Masterscriptie. Alle respondenten zullen een kopie van het onderzoek ontvangen.

Alvast bedankt voor het invullen van deze eerste vragenlijst!

Met vriendelijke groeten,

Lennart Harmelink

Vragenlijst

1. Hoe bekend bent u met de Alliantie contractvorm?
   - ○ 1 (Ik heb er nog nooit van gehoord)
   - ○ 2
   - ○ 3
   - ○ 4
   - ○ 5 (Ik heb er zelf mee gewerkt)
2. In welk project heeft u met een alliantie contract gewerkt?
3. Hoe bekend bent u met de New Engineering Contract – Engineering and Construction Contract (NEC3-ECC) contractvorm?
   - ○ 1 (Ik heb er nog nooit van gehoord)
   - ○ 2
   - ○ 3
   - ○ 4
   - ○ 5 (Ik heb er zelf mee gewerkt)
4. In welk project heeft u met een NEC3-ECC contract gewerkt?

Het onderzoek gaat over vertrouwen in de bouw. Op basis van literatuur ben ik tot een definitie van vertrouwen gekomen: “Vertrouwen is de bereidheid van partij A om zich kwetsbaar op te stellen tegenover een partij B, waarbij de verwachting overheerst dat de beslissingen die partij B maakt ook ten goede komen aan partij A zelf, zonder dat partij A op enigerlei wijze wordt geschaad en zonder dat de acties van partij B actief gecontroleerd moeten worden.”

5. Bent u het eens met de gegeven definitie van vertrouwen? Licht uw antwoord toe:
6. Hoe belangrijk vindt u wederzijds vertrouwen tussen de verschillende betrokken partijen in een bouwproject?
   - ○ 1 (Zeer onbelangrijk)
   - ○ 2
   - ○ 3
   - ○ 4
   - ○ 5 (Zeer belangrijk)
7. Kunt u een voorbeeld geven van een situatie bij een bouwproject waarbij vertrouwen tussen opdrachtgever en opdrachtnemer een positieve rol speelde in het project?
8. Hoe zeer bent u zich bewust van een vertrouwensband tussen opdrachtgever en opdrachtnemer tijdens het bouwproject, indien deze aanwezig is?
   - ○ 1 (Niet bewust)
   - ○ 2
   - ○ 3
   - ○ 4
   - ○ 5 (Zeer bewust)
9. Kunt u een voorbeeld geven van een situatie bij een bouwproject waarbij vertrouwen tussen opdrachtgever en opdrachtnemer, of het ontbreken daarvan, een negatieve rol speelde in het project?
10. Hoe zeer bent u zich bewust van het ontbreken van een vertrouwensband tussen opdrachtgever en opdrachtnemer tijdens het bouwproject, indien deze niet (of weinig) aanwezig is?
    - ○ 1 (Niet bewust)
    - ○ 2
    - ○ 3
    - ○ 4
    - ○ 5 (Zeer bewust)
11. “In bouwprojecten moet meer aandacht worden geschonken aan vertrouwen tussen opdrachtnemer en opdrachtgever.” Hoe zeer bent u het met deze stelling eens?
    - ○ 1 (Zeer oneens)
    - ○ 2
    - ○ 3
    - ○ 4
    - ○ 5 (Volledig mee eens)
12. Licht uw antwoord op vraag 11 toe in enkele zinnen:
13. Wat vindt u belangrijke deelaspecten van vertrouwen bij een bouwproject? Kruis aan welke volgens u van toepassing zijn: Ervaring van de ander
    - ○ Geloof in de kwaliteiten van de ander

- Professionaliteit van de ander
- Gedrag van de ander
- Verdeling van risico's
- Bereidheid tot meewerken van de ander
- Wederkerigheid
- Gelijke normen en waarden
- Openheid in communicatie
- Delen van informatie
- Optimisme
- Formele controle van het werk
- Verantwoordelijkheidsgevoel van de ander
- Reputatie van de ander
- Eerlijkheid van de ander
- Verdeling van werk

Vul indien mogelijk de bovenstaande lijst aan met extra deelaspecten van vertrouwen bij bouwprojecten:

14. Met welke controlemechanismen bent u bekend? Kruis aan waarmee u bekend bent:
    - Bouwinspectie
    - Extern bouwtoezicht
    - Gedragscodes
    - Risico management
    - Bijhouden van een bouwdagboek
    - Open boek accounting
    - Project start up
    - Waarschuwingsplicht
    - Tussentijdse evaluaties
    - Bouwvergaderingen
    - Kwaliteitsborging

Vul indien mogelijk de bovenstaande lijst aan met extra deelaspecten van vertrouwen bij bouwprojecten:

E1. Results of Delphi round 1

The Results of the first Delphi study are presented below.

Table 28: complete list of responses on Delphi round 1, question 13

Respondent number	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	#	%
Ervaring van de ander		1						1	1		1		1	1	1	1	1	1	10	55.56
Geloof in de kwaliteiten van de ander		1	1		1			1	1	1				1	1	1			9	50
Professionaliteit van de ander	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	17	94.44
Gedrag van de ander	1	1	1	1		1	1			1	1			1	1	1			11	61.11
Verdeling van risico's		1		1		1	1		1					1	1	1		1	9	50
Bereidheid tot meewerken van de ander	1	1	1		1	1	1		1	1	1			1	1	1		1	13	72.22
Wederkerigheid	1	1								1	1	1	1		1			1	8	44.44
Gelijke normen en waarden		1								1					1			1	4	22.22
Openheid in communicatie / transparantie	1		1			1				1	1							1	6	33.33
Delen van informatie	1	1	1		1	1	1	1	1	1			1	1	1	1		1	14	77.78
Optimisme		1	1		1					1				1	1	1			7	38.89
Formele controle van het werk		1							1				1	1	1			1	6	33.33
Verantwoordelijkheidsgevoel van de ander		1	1	1	1	1	1		1	1		1	1	1	1	1	1		14	77.78
Reputatie van de ander		1							1	1	1				1		1		6	33.33
Eerlijkheid van de ander	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1		1	16	88.89
Verdeling van werk		1		1											1			1	4	22.22
niet direct claimen	1																		1	5.556
project belang voor eigen belang	1					1			1		1								4	22.22
geen verborgen agenda	1									1	1			1					4	22.22
persoonlijke band	1	1								1				1		1	1		6	33.33
aandacht voor het menselijke	1									1				1					3	16.67
Redelijkheid	1			1		1				1									4	22.22
Referenties									1						1				2	11.11

Table 29: complete list of responses on Delphi round 1, question 14

Respondent number	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	#	%
Bouwinspectie	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	17	94.44
Extern bouwtoezicht	1	1	1	1	1	1	1		1	1	1	1	1		1			1	14	77.78
Gedragscodes	1	1	1	1	1	1	1	1	1	1		1	1		1			1	14	77.78
Risico management	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18	100
Bijhouden van een bouwdagboek	1	1	1	1		1	1	1	1	1		1	1		1				12	66.67
Open boek accounting	1	1		1	1	1	1		1								1	1	9	50
Project start up	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	17	94.44
Waarschuwingsplicht	1	1	1	1	1	1	1	1	1	1		1	1	1	1			1	15	83.33
Tussentijdse evaluaties	1	1	1	1		1	1	1	1	1	1	1	1	1	1		1	1	16	88.89
Bouwvergaderingen	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18	100
Kwaliteitsborging	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	17	94.44
informele meetings	1			1			1											1	4	22.22
bouwreflecties	1			1				1		1			1	1	1		1	1	9	50
geschillencommissies	1	1	1		1	1	1	1	1	1	1	1			1		1	1	14	77.78
escalatiemechanismen	1	1		1	1	1		1									1		7	38.89
project follow ups	1											1	1						3	16.67
partnerschap	1																		1	5.556
antecedentenonderzoek		1										1			1				3	16.67
keuringen			1					1	1			1	1	1	1			1	8	44.44
managementreview			1																1	5.556
afawijkingenregistratie			1											1					2	11.11
audits			1					1	1	1		1	1	1	1		1	1	10	55.56
dagstart							1	1											2	11.11
commisioning												1							1	5.556
Delen van kosten en winsten	1	1	1		1	1	1	1									1	1	9	50
Inzet bouw-mediator	1	1	1		1	1											1	1	7	38.89

Appendix F: Delphi Round 2 (Dutch)

Beste respondent,

Hierbij stuur ik u de tweede vragenlijst voor mijn afstudeeronderzoek. Het totale onderzoek behelst vier vragenlijsten in een zogenaamde 'Delphi studie', waarbij met behulp van de vragenlijsten wordt toegewerkt naar een consensus met een panel van experts en ervaringsdeskundigen.

Dit is vragenlijst nummer twee. Het doel is om elke week een nieuwe vragenlijst te versturen, wat alleen mogelijk is als elke respondent zijn/haar vragenlijst tijdig heeft ingevuld. Deze vragenlijst gaat verder op basis van antwoorden die zijn gegeven op de vorige vragenlijst. De vragenlijst zal niet meer dan 10 minuten van uw tijd in beslag nemen.

De hoofdvraag die ik met mijn onderzoek zal onderzoeken is: "Hoe beïnvloedt het wederzijds vertrouwen tussen opdrachtgever en opdrachtnemer een bouwproject dat wordt uitgevoerd met een Alliantie of NEC3-ECC contract?", met onder andere de sub-vragen "Wat is vertrouwen", "Is wederzijds vertrouwen belangrijk?", "Kan en moet vertrouwen contractueel worden vastgelegd?" en "Welke controlemechanismen hebben een positief effect op het vertrouwen?".

U bent gevraagd voor deelname aan dit onderzoek op basis van uw professionele expertise en werkervaring. Al uw antwoorden blijven volledig anoniem voor de andere respondenten. De analyse van de antwoorden wordt gepubliceerd in mijn Masterscriptie. Alle respondenten zullen een (digitale)kopie van het onderzoek ontvangen.

Alvast bedankt voor het invullen van deze tweede vragenlijst!

Met vriendelijke groeten,

Lennart Harmelink

Vragenlijst

1. Geef bij elk van deze aspecten van vertrouwen aan in welke mate ze een positieve bijdrage kunnen leveren aan het vertrouwen tussen opdrachtgever en opdrachtnemer, indien het aspect duidelijk aanwezig is in het proces:

Ervaring van de ander	○ 1 (Helemaal geen bijdrage)	○ 2	○ 3	○ 4	○ 5 (Een erg grote bijdrage)
Geloof in de kwaliteiten van de ander	○ 1	○ 2	○ 3	○ 4	○ 5
Professionaliteit van de ander	○ 1	○ 2	○ 3	○ 4	○ 5

Gedrag van de ander	○ 1	○ 2	○ 3	○ 4	○ 5
Verdeling van risico's en werk	○ 1	○ 2	○ 3	○ 4	○ 5
Bereidheid tot meewerken van de ander	○ 1	○ 2	○ 3	○ 4	○ 5
Wederkerigheid	○ 1	○ 2	○ 3	○ 4	○ 5
Openheid en transparantie	○ 1	○ 2	○ 3	○ 4	○ 5
Delen van informatie	○ 1	○ 2	○ 3	○ 4	○ 5
Formele controle van het werk	○ 1	○ 2	○ 3	○ 4	○ 5
Verantwoordelijkheidsgevoel van de ander	○ 1	○ 2	○ 3	○ 4	○ 5
Eerlijkheid van de ander	○ 1	○ 2	○ 3	○ 4	○ 5
Persoonlijke band	○ 1	○ 2	○ 3	○ 4	○ 5
Redelijkheid in beslissingen	○ 1	○ 2	○ 3	○ 4	○ 5

2. Motiveer één of meerdere van uw antwoorden:

3. Geef bij elk van deze aspecten van vertrouwen aan in welke mate ze een negatieve bijdrage kunnen leveren aan het vertrouwen tussen opdrachtgever en opdrachtnemer, indien het aspect duidelijk afwezig is in het proces:

Ervaring van de ander	○ 1 (Helemaal geen bijdrage)	○ 2	○ 3	○ 4	○ 5 (Een erg grote bijdrage)
Geloof in de kwaliteiten van de ander	○ 1	○ 2	○ 3	○ 4	○ 5
Professionaliteit van de ander	○ 1	○ 2	○ 3	○ 4	○ 5
Gedrag van de ander	○ 1	○ 2	○ 3	○ 4	○ 5
Verdeling van risico's en werk	○ 1	○ 2	○ 3	○ 4	○ 5
Bereidheid tot meewerken van de ander	○ 1	○ 2	○ 3	○ 4	○ 5
Wederkerigheid	○ 1	○ 2	○ 3	○ 4	○ 5
Openheid en transparantie	○ 1	○ 2	○ 3	○ 4	○ 5
Delen van informatie	○ 1	○ 2	○ 3	○ 4	○ 5
Formele controle van het werk	○ 1	○ 2	○ 3	○ 4	○ 5
Verantwoordelijkheidsgevoel van de ander	○ 1	○ 2	○ 3	○ 4	○ 5
Eerlijkheid van de ander	○ 1	○ 2	○ 3	○ 4	○ 5
Persoonlijke band	○ 1	○ 2	○ 3	○ 4	○ 5
Redelijkheid in beslissingen	○ 1	○ 2	○ 3	○ 4	○ 5

4. Motiveer één of meerdere van uw antwoorden:

Uit de vorige vragenlijst kwam duidelijk naar voren dat er behoefte is aan meer aandacht voor wederzijds vertrouwen in bouwprojecten. Een van de manieren waarop dit kan worden bewerkstelligd is het inzetten van de juiste controlemechanismen (sturingsmechanismen, proces-tools, managementmechanismen, etc.).

5. Geef van elk van deze controlemechanismen aan in welke mate ze een positieve of negatieve bijdrage leveren aan het vertrouwen tussen opdrachtgever en opdrachtnemer, indien het controlemechanisme wordt toegepast:

Bouwinspectie	○ 1 (Helemaal geen bijdrage)	○ 2	○ 3	○ 4	○ 5 (Een erg grote bijdrage)
Extern Bouwtoezicht	○ 1	○ 2	○ 3	○ 4	○ 5
Gedragscodes	○ 1	○ 2	○ 3	○ 4	○ 5
Risico management	○ 1	○ 2	○ 3	○ 4	○ 5
Bijhouden van een bouwdagboek	○ 1	○ 2	○ 3	○ 4	○ 5
Open boek accounting	○ 1	○ 2	○ 3	○ 4	○ 5
Project start up	○ 1	○ 2	○ 3	○ 4	○ 5
Waarschuwingsplicht	○ 1	○ 2	○ 3	○ 4	○ 5
Tussentijdse evaluaties	○ 1	○ 2	○ 3	○ 4	○ 5
Bouwvergaderingen	○ 1	○ 2	○ 3	○ 4	○ 5
Kwaliteitsborging	○ 1	○ 2	○ 3	○ 4	○ 5
Informele meetings	○ 1	○ 2	○ 3	○ 4	○ 5
Bouwreflecties	○ 1	○ 2	○ 3	○ 4	○ 5
Geschillencommissies	○ 1	○ 2	○ 3	○ 4	○ 5
Audits	○ 1	○ 2	○ 3	○ 4	○ 5
Delen van winst en verliest	○ 1	○ 2	○ 3	○ 4	○ 5
Inzet ‘bouw mediator’	○ 1	○ 2	○ 3	○ 4	○ 5

6. Motiveer één of meerdere van uw antwoorden:

7. Hoe belangrijk vindt u het dat er aandacht wordt besteed aan het vertrouwen tussen opdrachtgever en opdrachtnemer door middel van controlemechanismen?
   ○ 1 (Zeer onbelangrijk) ○ 2 ○ 3 ○ 4 ○ 5 (Zeer belangrijk)

8. Motiveer uw antwoord:

9. Hoe belangrijk vindt u het dat er op een informele wijze aandacht wordt besteed aan het vertrouwen tussen opdrachtgever en opdrachtnemer?
   ○ 1 (Zeer onbelangrijk) ○ 2 ○ 3 ○ 4 ○ 5 (Zeer belangrijk)

10. Motiveer uw antwoord:

11. Hoe belangrijk vindt u het dat er aandacht is voor vertrouwen als onderdeel van een contract?
    ○ 1 (Zeer onbelangrijk) ○ 2 ○ 3 ○ 4 ○ 5 (Zeer belangrijk)

12. Motiveer uw antwoord:

F1. Results of Delphi round 2

The Results of the second Delphi study are presented below.

Table 30: Delphi 2.1: ranks of positive aspects of trust

Trust positive effect	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	average
Experience of the trustee	4	4	4	4	4	4	2	5	5	5	4	4	2	4	3.93
Belief in the trustee's quality	5	4	5	5	5	4	3	5	5	5	4	4	3	5	4.43
Professionalism of the trustee	4	4	5	4	4	4	4	5	5	4	4	4	4	5	4.29
Behaviour of the trustee	4	5	5	4	5	3	5	5	5	4	5	3	2	3	4.14
Division of risks and works	4	1	4	4	4	3	5	4	4	4	4	3	5	5	3.86
Willingness to cooperate of the trustee	4	4	5	5	5	3	5	5	5	5	5	3	4	5	4.5
Reciprocity	1	4	4	4	4	3	5	5	4	4	4	3	2	4	3.64
Openness and transparency in communication	4	4	5	5	5	3	5	5	5	5	4	4	5	4	4.5
Sharing of information	4	4	5	5	5	3	5	5	5	3	5	3	4	5	4.36
Formal control of works	2	3	4	4	3	4	3	3	5	4	4	4	5	3	3.64
Responsibility of the trustee	4	4	4	4	4	4	5	5	5	4	4	4	5	5	4.36
Honesty of the trustee	5	4	5	5	5	4	5	5	5	4	5	4	5	5	4.71
Personal relationship with the trustee	4	5	3	4	3	4	5	4	4	3	4	4	4	4	3.93
Reasonable decisions of the trustee	3	4	5	4	4	3	5	3	5	4	4	3	5	3	3.93

Table 31: Delphi 2.3: ranks of negative aspects of trust

Trust negative effect	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	Average
Experience of the trustee	3	4	4	4	3	2	2	4	5	3	4	4	4	5	3.64
Belief in the trustee's quality	5	4	3	4	5	2	3	5	4	4	3	3	5	4	3.86
Professionalism of the trustee	4	4	4	4	4	2	3	5	5	4	5	3	5	5	4.07
Behaviour of the trustee	4	4	5	3	5	2	5	5	5	5	4	2	5	5	4.21
Division of risks and works	3	4	5	3	4	3	3	4	4	4	3	2	3	4	3.5
Willingness to cooperate of the trustee	4	4	5	5	5	3	5	5	5	5	3	5	5	5	4.57
Reciprocity	1	4	3	4	4	3	5	5	5	4	3	4	2	4	3.64
Openness and transparency in communication	4	4	2	4	5	3	3	5	5	5	5	3	5	4	4.07
Sharing of information	4	4	3	3	5	3	3	5	5	5	3	3	5	4	3.93
Formal control of works	3	4	2	3	3	3	3	3	5	3	4	4	4	5	3.5
Responsibility of the trustee	4	4	4	4	4	2	5	4	5	4	2	3	4	4	3.79
Honesty of the trustee	4	4	4	3	5	2	5	5	5	5	3	5	5	5	4.29
Personal relationship with the trustee	4	4	2	3	3	2	4	5	4	3	3	2	3	4	3.29
Reasonable decisions of the trustee	4	4	4	3	4	3	5	4	5	4	3	5	4	5	4.07

Table 32: Delphi 2.5: ranks for importance of control mechanism to trust relationship

control mechanisms	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	Average
Building inspections	4	3	3	3	2	3	3	4	5	3	2	4	4	4	3.36
External supervision	4	3	4	3	3	3	3	4	5	4	3	3	3	4	3.5
Rules of conduct	3	3	5	4	4	4	3	5	5	4	5	2	3	5	3.93
Risk management	3	3	3	5	4	4	4	4	5	5	4	4	5	4	4.07
Construction journal	3	3	2	3	3	3	3	4	5	3	4	3	3	4	3.29
Open book accounting	4	3	5	3	5	4	4	5	4	3	5	4	3	5	4.07
Project start up	4	3	4	5	5	4	4	5	4	4	5	4	4	4	4.21
Early warning duty	4	3	3	3	4	2	5	5	5	3	4	2	4	5	3.71
Interim evaluations	4	3	4	4	5	4	5	5	5	4	4	4	5	3	4.21
Process meetings	4	3	3	3	4	3	3	5	5	3	4	4	3	4	3.64
Quality assurance	4	3	5	5	4	4	3	3	5	5	4	3	3	3	3.86
Informal meetings	3	3	4	4	5	4	4	5	5	4	4	3	4	5	4.07
Building reflections	3	3	4	3	4	4	5	5	4	2	4	4	4	5	3.86
Dispute boards	3	3	3	3	4	2	3	5	3	3	3	2	3	5	3.21
Audits	2	3	4	3	4	3	4	4	5	3	4	3	4	4	3.57
Sharing of profits and losses	4	5	4	3	4	4	4	5	5	3	5	4	4	5	4.21
Adjudication	3	3	4	3	4	3	4	5	2	4	4	2	3	5	3.5

Appendix G: Delphi Round 3 (Dutch)

Beste respondent,

Hierbij stuur ik u de derde vragenlijst voor mijn afstudeeronderzoek. Met behulp van de vragenlijsten wordt toegewerkt naar een consensus met een panel van experts en ervaringsdeskundigen. Dit zal naar alle waarschijnlijkheid de laatste vragenlijst zijn in de reeks.

Deze vragenlijst gaat verder op basis van antwoorden die zijn gegeven op de vorige vragenlijsten. De vragenlijst zal niet meer dan 10 minuten van uw tijd in beslag nemen.

De hoofdvraag die ik met mijn onderzoek zal onderzoeken is: “Hoe beïnvloedt het wederzijds vertrouwen tussen opdrachtgever en opdrachtnemer een bouwproject dat wordt uitgevoerd met een Alliantie of NEC3-ECC contract?”, met onder andere de sub-vragen “Wat is vertrouwen”, “Is wederzijds vertrouwen belangrijk?”, "Kan en moet vertrouwen contractueel worden vastgelegd?" en “Welke controlemechanismen hebben een positief effect op het vertrouwen?”.

U bent gevraagd voor deelname aan dit onderzoek op basis van uw professionele expertise en werkervaring. Al uw antwoorden blijven volledig anoniem voor de andere respondenten. De analyse van de antwoorden wordt gepubliceerd in mijn Masterscriptie. Alle respondenten zullen een (digitale)kopie van het onderzoek ontvangen.

Alvast bedankt voor het invullen van deze derde en laatste vragenlijst!

Met vriendelijke groeten,

Lennart Harmelink

Vragenlijst

1. Wat is het meest belangrijke aspect van vertrouwen? Kunt u de volgende tien aspecten van vertrouwen rangschikken van op volgorde van belangrijkheid voor het bouwen aan een vertrouwensband in een bouwproject? Waarbij geldt: rang 1 = minst belangrijk; rang 10 = meest belangrijk.

Geloof in de kwaliteiten van de ander
Gedrag van de ander
Bereidheid tot meewerken van de ander
Openheid en transparantie
Delen van informatie
Formele controle van het werk
Verantwoordelijkheidsgevoel van de ander
Eerlijkheid van de ander
Persoonlijke band

Redelijkheid in beslissingen

2. Welk controlemechanisme heft de meest positieve invloed op het vertrouwen in een bouwproject? Kunt u de volgende 10 controlemechanismen rangschikken? Waarbij geldt: rang 1 = minste positieve invloed op vertrouwen; rang 10 = meest positieve invloed op vertrouwen.

Gedragscodes
Risicomanagement
Open boek accounting
Project start up
Waarschuwingsplicht
Tussentijdse evaluaties
Bouwvergaderingen
Kwaliteitsborging
Informele bijeenkomsten en afspraken
Delen van winst en verliest

3. Licht uw top 3 uit de voorafgaande vraag toe: Waarom deze mechanismen? Waardoor zal het naar verwachting een positief effect hebben?

Uit voorgaande vragenlijsten blijkt dat er behoefte is aan een formele regeling van vertrouwen in projecten.

4. Op wat voor manier kan vertrouwen het beste worden opgenomen in een contract?

5. Hoe kan dit naar uw idee het beste worden verwoord?

6. Wat zal naar verwachting het effect hiervan zijn op de praktijk?

G1. Results of Delphi round 3

The Results of the third Delphi study are presented below.

Table 33: Delphi 3.1: ranking trust aspects

Trust aspect	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
Honesty of the trustee	10	10	8	9	3	7	9	9	7	8	9	9	10	9
Openness and transparency in communication	9	7	6	10	8	10	4	6	4	9	10	8	9	8
Willingness to cooperate of the trustee	8	5	4	7	9	6	10	5	6	10	8	10	6	7
Behaviour of the trustee	5	1	10	8	10	9	2	7	8	6	7	7	7	1
Responsibility of the trustee	2	6	7	4	4	2	6	8	10	4	4	2	5	10
Belief in the trustee's quality	6	8	3	6	5	4	8	1	5	7	5	4	2	6
Reasonable decisions of the trustee	3	9	9	2	7	1	5	10	2	5	6	5	1	5
Personal relationship with the trustee	7	4	1	3	2	3	7	4	9	2	2	6	8	2
Sharing of information	1	2	5	5	6	8	3	3	3	3	1	3	3	4
Formal control of works	4	3	2	1	1	5	1	2	1	1	3	1	4	3

Table 21: Delphi 3.1: analysis of data

Trust aspect	Total	Mean	Mode	Range	Median	SD	W
Honesty of the trustee	117	8,357142857	9	7	9	11803,27041	0,729948696
Openness and transparency in communication	108	7,714285714	8, 9, 10	6	8	10057,22449	0,621968119
Willingness to cooperate of the trustee	101	7,214285714	6	6	7	8795,760204	0,543955486
Behaviour of the trustee	88	6,285714286	7	9	7	6677,22449	0,412939053
Responsibility of the trustee	74	5,285714286	4	8	4,5	4721,653061	0,292000808
Belief in the trustee's quality	70	5	5, 6	7	5	4225	0,261286333
Reasonable decisions of the trustee	70	5	5	9	5	4225	0,261286333
Personal relationship with the trustee	60	4,285714286	2	8	3,5	3104,081633	0,191965469
Sharing of information	50	3,571428571	3	5	3	2155,612245	0,133309353
Formal control of works	32	2,285714286	1	4	2	882,9387755	0,054603511

Table 34: Delphi 3.2: ranking control mechanisms

Control mechanisms	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
Project start up	5	4	7	10	7	9	8	4	10	8	10	10	7	8
Open book accounting	10	9	9	6	6	3	3	7	2	7	9	7	10	9
Informal meetings	7	6	4	7	8	1	10	9	5	5	8	9	6	7
Risk management	4	8	2	5	10	6	4	2	7	10	7	8	4	6
Quality assurance	3	7	3	1	5	7	7	3	9	9	5	5	3	2
Interim evaluations	1	5	8	9	3	8	6	6	8	1	6	2	1	4
Sharing of profits and losses	6	10	10	3	4	5	1	5	1	6	4	3	8	1
Rules of conduct	8	2	1	8	2	10	9	1	6	3	3	6	5	3
Early warning duty	9	1	5	2	1	2	2	10	3	4	1	4	9	10
Process meetings	2	3	6	4	9	4	5	8	4	2	2	1	2	5

Table 23: Delphi 3.2: analysis of data

Control mechanisms	Total	Mean	Mode	Range	Median	SD	W
Project start up	107	7,642857143	10	6	8	9871,841837	0,610503515
Open book accounting	97	6,928571429	9	7	7	8112,862245	0,501723083
Informal meetings	92	6,571428571	7	9	7	7298,040816	0,451332147
Risk management	83	5,928571429	4	8	6	5940,005102	0,367347254
Quality assurance	69	4,928571429	3	8	5	4105,147959	0,253874333
Interim evaluations	68	4,857142857	1, 6, 8	8	5,5	3987,020408	0,24656898
Sharing of profits and losses	67	4,785714286	1	9	4,5	3870,617347	0,239370275
Rules of conduct	67	4,785714286	3	9	4	3870,617347	0,239370275
Early warning duty	63	4,5	1, 2	9	3,5	3422,25	0,211641929
Process meetings	57	4,071428571	2	8	4	2801,433673	0,173248836

Appendix H: Interview setup

Introduction:
Start with an explanation of the research and its goals. The questions that are prepared are mostly discussed during the interactive talk, and not as always asked as questions as such.

General questions:
The first part of the interview is meant to give insight in the general experience and characteristics of the interviewee.

- What is your experience with UAV-GC contracts?
- What is your experience regarding the alliance contract?
- What is your experience regarding the NEC-ECC contract?
- In case you have experience with both types of contracts, can you tell the difference between the contracts in your opinion?
- Can you explain why construction companies nowadays tend to use more innovative types of contracts rather than the traditional contracts?
- Why are the contracts not being used more often?
- In which construction projects have you worked with these contracts?
- What was your role in those projects?

Questions regarding the case projects (International Criminal Court / Isala Hospital):
The second part of the interview will provide more information on the actual processes during the case projects. The questions are focused on the tender and choice for contract and the workings of trust during the project.

- How was the tender organized?
- Which factors were decisive in the tender?
- In what way was 'trust' a part of the selection of contractors?
- Why was the project carried out under an alliance contract / under a NEC3-ECC contract?
- If so, why do you think this contract was suitable for this project?
- How was the cooperation between the different companies structured?
- How did you experience this cooperation?
- In what way were the subcontractors contracted?
- Was the project a success?

Questions regarding project control during the case projects:
The third part of the interview zooms in on control mechanisms for construction projects.

- Do you know what is meant by 'control mechanisms'? (examples: open book accounting, risk register, project start-up, early warning system, sharing of information)
- How do you think a projects quality can best be assured?
- Which control mechanisms have been applied in the project?
- Were the control mechanisms in the project mostly formal or informal?
- What was the effect of the control mechanisms on the project?
- Where there any legal disputes?
- How were the disputes settled?
- How is the level of trust affected by the control mechanisms?

Questions regarding trust in construction projects:
The fourth part of the interview will provide more general information regarding trust in construction projects and specific information for trust in the case projects.

- Can you tell me what 'trust' means to you?
- What do you think of the following statement? "Trust in the construction industry is important."
- In what way do you think trust can have a positive influence on a construction project?
- In what way do you think trust can have a negative influence on a construction project?
- Did you notice any of these positive or negative effects during the construction?
- In what way is trust described in the contract?
- How could it be described in future Dutch contracts?
- Is it needed or desirable to incorporate 'trust' in a contract?

Closing questions:
Some simple closing questions.

- Do you also want to participate in the Delphi study?
- Do you want to remain anonymous?
- Do you have any suggestions for the research?

Appendix I: Interview Transcripts

Because the interview set up was more of an informal talk than a questionnaire, the interview transcripts are not literally written down, but summaries of the talks.

I1. Menno Meulebeek

Menno Meulebeek is a senior project manager at Brink Group. He was involved with the management of the ICC from start to finish. Brink Group was hired by the ICC to do the project management for the construction. They were involved with the project from the pre-contractual phase.

General questions:

- What is your experience with UAC-IC contracts?

UAC-IC is something Meulebeek knows mainly from literature and study.

- What is your experience regarding the alliance contract?

Meulebeek states to know the mechanisms regarding the alliance contract. Alliances are not used very often in building projects.

- What is your experience regarding the NEC-ECC contract?

After his graduation in 2010, Meulebeek started working at Brink Group. His first project was the ICC. When he joined the project, they were finishing the draft designs. As a junior project manager, Meulebeek was involved with setting up the tender and doing research into which contract we would use. He has done courses regarding NEC, and during the project he has built up an expertise for NEC3 contracts.

- In case you have experience with the types of contracts, can you tell the difference between the contracts in your opinion?

The UAC-IC contracts are based on a situation in which two or more parties are opposite to each other. Client and contractor are separate and have very different goals for the project. You could say that the contracts are based on mistrust rather than trust. The NEC3 contract, specifically the target contract is based on trust and cooperation.

- Can you explain why construction companies nowadays tend to use more innovative types of contracts rather than the traditional contracts?

Ideally companies might want to pick the companies with which they work together on a project based on their previous cooperation and level of trust (cherry picking). In a public tender this can't be done because of the rules for government tenders. Even though governments are bound by rules, in the project companies should be motivated to build a trusting relationship with each other for a better cooperation. This also opens up the process for more innovative ideas and solutions.

- Why are the contracts not being used more often?

Meulebeek thinks contractors are not used to be involved in the early stages of the project. A government policy would help motivate companies to be involved in alliance or NEC3 contracts.

Questions regarding the case projects (International Criminal Court / Isala Hospital):

- How was the tender organized?

It was a European tender. It was not a public tender, but every company could sign up for the tender at first. We invited a selection of companies to tender after. The combination of companies called Courtys was awarded the project.

- Which factors were decisive in the tender?

In the end the price/quality ratio was decisive.

- In what way was 'trust' a part of the selection of contractors?

It is not standard that trust is a part of the tender process, but the trust factor was all over the tender due to the type of contract. During the selection, they have asked all contenders to their vision on cooperation and trust.

- Why was the project carried out under an alliance contract / under a NEC3-ECC contract?

At the start of the project, a comparison between Fidic, NEC3 and UAC-IC was made. There was a British project director and because in England the NEC3 contract is more or less the standard for this kind of project, he was very familiar with this contract. The NEC3 is written in English and for international law, this made it possible for foreign companies to join in the tender as well. They found that there were many other advantages of using the NEC3-ECC type of contract for this project as well: handles for good cooperation, a means to guide the project.

- How was the cooperation between the different companies structured?

A consortium of different companies was constructed and called Courtys. Courtys consisted of Visser en Smit, Boele van Eesteren and Homij/Imtech.

- In what way were the subcontractors contracted?

The philosophy of the NEC3 contract is for subcontractors to join in the main contract. The consortium could decide on how to contract subcontractors. In this project not all subcontractors joined in the NEC contract, but some were contracted under traditional contracts.

- Was the project a success?

Yes

Questions regarding project control during the case projects:

- Do you know what is meant by 'control mechanisms'? (examples: open book accounting, risk register, project start-up, early warning system, sharing of information)

Yes, although the word control mechanism is not applicable to all mechanisms.

- Which control mechanisms have been applied in the project?

- Opportunity register, they were looking for opportunities during the project.
- Early warning system, this provided the companies to strife for cost reduction in cooperation with each other. Meulebeek is a big fan of the early warning system and he thinks other projects should also use this as a mechanism to build trust and a higher quality project.
- There was an adjudicator present during the project. This is a part of the NEC3 contract. The adjudicator makes sure that disputes can be settled before they go to court, like a mediator. The adjudicator is independent from any company.
- Open book accounting was applied because of the target contract. It is a means to take away any suspicion towards the partners.
- Evaluations, milestones
- Risk register and opportunity register
- A project start up (PSU) was organized so the people could get to know each other.
- Shared office space

- Were the control mechanisms in the project mostly formal or informal?

Mostly formal, but the NEC3 contract gives a lot of room to the interpretation and execution of the control mechanism. Meulebeek thinks it would be good to have more informal control mechanisms like a code of conduct for behavior and general mission statements, but the formal control is needed to guide a project.

- What was the effect of the control mechanisms on the level of trust?

Sometimes you have to be strict in a project. This can influence the level of trust in a negative way, but in the end the project will benefit.

- Where there any legal disputes?

Due to the presence of an adjudicator the disputes were settled before they became problematic. Of course there were some struggles concerning contract variations.

Questions regarding trust in construction projects:

- Can you tell me what 'trust' means to you?

Trust and cooperation are closely linked, but not substitutes. Trust is being honest and open, not to beat about the bush, but be straight in work and processes.

- What do you think of the following statement? "Trust in the construction industry is important."

Yes. Of course it depends on the type of project and client. However, Meulebeek thinks everyone works better in trusting environment.

- In what way do you think trust can have a positive influence on a construction project?

There were no double agenda's in the ICC project. It is believed that the quality of the project was better due to openness and honesty of all companies and a good cooperation.

- In what way do you think trust can have a negative influence on a construction project?

It can be hard to admit faults that have a negative financial result.

- In what way is trust described in the contract?

Clause 10.1 specifically states trust. This is a characteristic for the contract and the complete contract is written for cooperation and trust. By stating trust specifically in the contract, it is positive for the cooperation. In a regular UAC-IC contract, companies are also working together, but more separate from each other, because they have their own goals and processes.

- How could it be described in future Dutch contracts?

Trust must be something informal and feel like it is voluntary. It could work if it were something like a covenant for creating awareness. It must be backed with formal mechanisms like open book accounting and informal mechanisms like meetings.

- Is it needed or desirable to incorporate 'trust' in a contract?

It would be a very welcome addition to the UAC-IC and the cooperation between client and contractors. It would bring a better cooperation and better results.

I2. Arent van Wassenaer

Arent van Wassenaer is a self-employed juridical advisor with over 30 years of experience in building and contract law. He was involved with the Isala Hospital by writing the WIU contract. This contract is a derivative of the AC. During his years of work he has worked with many different contracts in different projects.

General questions:

- What is your experience with UAC-IC contracts, alliance contracts and the NEC3 contract?

As a lawyer and juridical advisor with over 30 years of experience, Arent van Wassenaer has got very much experience with all sorts of contracts in the construction industry. Van Wassenaer wrote several contracts, papers and books on contracts and building law.

With the Isala Hospital, a variation of the alliance contract has been used, which is called the 'werkinuitvoering' (WIU) contract. Van Wassenaer and Thomas (2008) wrote the contract for the IH in 2008.

- What was your role in the project?

Van Wassenaer was the juridical advisor for the IH, the client in the Isala case. At the time Van Wassenaer was called to the project, the management company Twynstra Gudde had already done the groundwork for the contracts. Van Wassenaer made the contracting agreement and the WIU contract. He was also involved with helping the different stakeholders to align with the project and the situation.

- In case you have experience with the types of contracts, can you tell the difference between the contracts in your opinion?

In the end, all contracts are contracting agreements, so in that respect there is no difference. The difference is in the content, structure and objective of the contracts. The NEC3 has for example a very specific contracting entity with specific roles like a project manager and a project supervisor. A striking characteristic of the AC is the alliance budget: a benchmark for the contracting budget that can be overrun or underrun. The resulting profits and losses are shared amongst the involved parties.

In the WIU contract, a lot of parts have been copied from the AC. The core principle of the WIU was: We do whatever is best for the project. Other core principles for cooperation in the WIU were: trusting each other, open book accounting and no disputes.

- Why did you choose to write up a new contract?

Van Wassenaer has written multiple pre-advices for the Instituut voor Bouwrecht. The current tendency is: two parties fight it out on paper, a basis of mistrust rather than trust. The current attitude of builders towards UAC and UAC-IC contracts is negative, so we decided to write a new contract with a bigger emphasis on cooperation rather than struggle.

The UAC-IC has developed over the years as well. Due to the negative attitude and fear of disputes, the word 'approve' in the contracts has been substituted by the word 'accept', because with approval, the responsibility will be shared, whilst with acceptance, the responsibility stays with the owner. This reflects the need for a new contract with a bigger emphasis on trust and cooperation.

- Why are the contracts not being used more often?

The building projects are not complex enough yet. Nowadays the bigger building projects tend to follow infrastructure projects, and thereby apply new integrated contracts.

Questions regarding the case projects (International Criminal Court / Isala Hospital):

- How was the tender organized?

All the contestants were asked to provide a detailed plan on how to make the project a success. It was like a best value procurement tender, although at the time that did not yet exist as such. The Design 2 Build (D2B) consortium was awarded the project.

After the tender, the IH was contracted in two phases: the building partnering phase and the formulation of the WIU contract. In the building partnering phase, the different stakeholders had one year to come up with detailed building specifications on the basis of a need for optimization.

- In what way was 'trust' a part of the selection of contractors?

Trust might have been the most important thing. It was woven all through the tender and the contract. The WIU took a lot of aspects from the AC and the NEC3-ECC regarding trust. One example is article 2 of the WIU (Van Wassenaer & Thomas, 2008): "to cooperate in service of the project." This can be compared to article 10 of the NEC3 in some ways: "the employer, the contractor, the project Manager and the supervisor shall all act as stated in this contract and in a spirit of mutual trust and cooperation."

- How was the cooperation between the different companies structured?

The partnering structure was very good for the project. Partnering is not a legal agreement, so most of the success came from the persons involved. The involved people met to make plans together. Most of the meetings had an informal characteristic, however the results were concrete and made tangible. At the building site a code of conduct was presented for every worker on site. This code of conduct had been signed by all involved managers.

- Was the project a success?

Yes, the project was a big success. However, the question can be raised to what extend the contractual model is responsible for this success. This is a question Suprapto (2016) also asked himself in his doctoral thesis. He concluded that this is not the case, but that contracting is a second order concern and that a good project preparation is more important.

Questions regarding project control during the case projects:

- Do you know what is meant by 'control mechanisms'? (examples: open book accounting, risk register, project start-up, early warning system, sharing of information)

Yes

- Which control mechanisms have been applied in the project?
  - Open book accounting was applied in the project. This made sure that every stakeholder could see the balance and budget of the project and the other involved companies at all times. This was a huge benefit to the trust relationship.
  - An early warning system was effective throughout the project. This made sure that disputes would not arise.

Whether or not the control mechanisms might have been construed as something negative to the process can only be answered by the contractors themselves. Control mechanisms can be used to bridge the gap from mistrust to trust, when they are used correctly.

- Were the control mechanisms in the project mostly formal or informal?

There were both formal and informal control mechanisms. The informal control mechanisms can be written under the denominator 'partnering'. To this category belong things like personal behavior, how to celebrate successes, having drinks, etc.

- Where there any legal disputes?

There has not been a single legal dispute during the project, which is unique for a project of this size. Of course, there have been problems, but they were countered before they worsened. Problems were separated from the people responsible and taken head on. Behavior around problems is very important for the trust and cooperation.

With the IH project, a board of arbitration was involved. This board consisted of two neutral building experts and one person from outside the construction industry. Every three months they came and observed the building process. They made an assessment and reported this to the building managers. This way the managers were able to resolve problems before disputes arose.

Questions regarding trust in construction projects:

- Can you tell me what 'trust' means to you?

Much has been written about trust. Trust is having each other's best interest at heart, act accordingly and according to the project goals at the same time. You should be able to rely on each other in vulnerability and benefit from each other. Certainty and trust are in line with each other, therefore a contract should provide certainty when needed.

- In what way do you think trust can have a negative influence on a construction project?

When everything becomes overly soft, this can turn into more problems. In the contract it is stated what a party must comply to, this has to be followed carefully. When a claim needs to be submitted, this has to be done, and not postpone it because the stakeholders like each other. Good contract management is as important as good cooperation.

- In what way is trust described in the contract?

Trust is all-out through the contract. It is never explicitly mentioned, but a lot of aspects and articles imply trust.

- How could it be described in future Dutch contracts?

In the NEC3 trust is explicitly mentioned in article 10.1. In Dutch contracts, this is not the case. In The Netherlands, this should actually not be needed, because we have a clause in civil law stating that we are supposed to act out of reasonableness and fairness ('redelijkheid and billijkheid'). In Dutch contracting law, less has to be written down than in English law, this is a big difference.

In order to put 'trust' in contracts, it can best be done by writing down certain mechanisms that contribute to trust rather than mentioning it explicitly. A certain level of informality is required. This could also be realized with the current UAC-IC contracts, however a layer regarding trust should be built in. In this layer, more attention should go towards the human factor and communication. Besides the contract, an agreement for partnering could take off the sharp edges of the contract itself.

The contract is less important than the cooperation of the people involved and their mutual trust. The contract can provide boundary conditions for this cooperation. A lot of attention should be paid to the people involved.

- Is it needed or desirable to incorporate 'trust' in a contract?

Although legally it might not be needed to write any clause regarding trust down in a contract, there is a certain need from within the construction industry. It cannot be fit into a contract, you can only try to provide guidelines and mechanisms to strengthen a trust relation.

A contract containing trust will only work when the things that are in the contract are lived through and operationalized. The most important thing is to have common goals and act accordingly. There is no perfect contract as there is no flawless execution of error-free drawings. In the end relational attitude and teamworking quality are the most important, as long as the contract is good enough to support this and there are no inconsistencies.

I3. Rens Polinder

Rens Polinder has over 30 years of experience in the construction industry. He always worked for BAM, a Dutch contractor. He was a regional director for BAM and he was appointed project director for the D2B Isala consortium. He is currently a self-employed adviser.

General questions:

- What is your experience with UAC-IC contracts?

Polinder has done many UAC-IC projects during his career.

- What is your experience regarding the alliance contract?

The Isala Hospital is the first alliance project Polinder has realized.

- What is your experience regarding the NEC-ECC contract?

Polinder has never been involved with a project performed under a NEC3 contract.

- Can you explain why construction companies nowadays tend to use more innovative types of contracts rather than the traditional contracts?

Polinder explains: 30 years ago, we used to work with a 'bouwheer', who coordinated the construction projects. Contractors simply had to deliver what was asked, without too many rules and contractual obligations. More and more rules and regulations arose over time, and the contractors were victim. This lead to a more anonymous industry, contractors were blamed and a situation of mistrust was created. Currently, there are too much intermediate steps in communication and too many different stakeholders. The current tendency counters this: the construction industry wants a situation in which companies can trust each other and cooperate with aligned interests.

Questions regarding the case projects (International Criminal Court / Isala Hospital):

- How was the tender organized?

From a long-list the client formulated the short list, which consisted of five different consortia that were assessed.

- Which factors were decisive in the tender?

Each contender had to budget a small part of the entire project instead of the entire project. The contractors were assessed on this financial budget. Another important factor was the personal relationship. Every client has its preferred contractors, but in every project the contractor has to prove its worth again.

- In what way was 'trust' a part of the selection of contractors?

At first, the relationship is assessed with informal meetings and serious games. Also, the plans and visions have to be assessed. Everyone behaves differently in each situation. At first companies always want to like each other and act accordingly.

- Why was the project carried out under an alliance contract / under a NEC3-ECC contract?

When the tender was finished, the contract was drafted from scratch in communication and cooperation with all stakeholders. The WIU contract was written with everyone's interests in mind.

- In what way were the subcontractors contracted?

The contractors contracted the subcontractors with traditional contracts.

- Was the project a success?

Yes. This is because we took a very long time in the start-up period. We took are time to align our interests beforehand.

Questions regarding project control during the case projects:

- Which control mechanisms have been applied in the project?
  - Open book accounting,
  - Building reflections: a neutral person joins the process meetings on regular intervals and evaluates the cooperation between stakeholders. Cooperation is not assessed in depth on technical content, but on communication and informal cooperation.
  - Code of conduct: always act in the project's interest.
  - Quality assurance
  - Neutral advisory board

- Were the control mechanisms in the project mostly formal or informal?

The control mechanisms were mostly formal, but it process was informal. Polinder prefers informal over formal control.

- What was the effect of the control mechanisms on the level of trust?

The effect of the control mechanisms is for a big part dependent on the person executing the control.

- Where there any legal disputes?

There were some disagreements during the project. According to Polinder, it is nearly impossible to realize a project of this size without disputes. In the project, there was an informal rule stating: 'no whining allowed'. If needed, a mediator would solve the disagreements.

- How is the level of trust affected by the control mechanisms?

When control mechanisms return with positive feedback, you will trust the other party more and reduce the need for control.

Questions regarding trust in construction projects:

- Can you tell me what 'trust' means to you?

Trust is a combination of factors: Being able to make agreements, without having to worry about the results. Cooperate with the same goals in mind.

- What do you think of the following statement? “Trust in the construction industry is important.”

According to Polinder, trust is one of the most important things. It ill smoothen the process of cooperation.

- In what way do you think trust can have a negative influence on a construction project?

According to Polinder, a certain distance is needed. If two stakeholders become to close, suspicion might arise.

- How could it be described in future Dutch contracts?

The trust relationship should be present in the entire organization. The contract should be in everybody’s interest. Polinder thinks it will be very difficult to describe trust in contracts. The current UAC-IC lacks flexibility and room for two-sided consultation, thins should be incorporated in new contracts. Explicitly naming trust in contract might help to support the purpose of contracts: good cooperation, leave room for changes and flexible, ad hoc solutions.

Extra additions should be made to the contract by a means of control mechanisms, for instance a code of conduct, reflection on the process, advisory board. These control mechanisms are meant to deliver comfort to the process. More formal control mechanisms are also possible: quality assurance.

Stakeholders, and employees on site, should also be rewarded for good conduct, rather than only be punished by faults.

- Is it needed or desirable to incorporate ‘trust’ in a contract?

The contract is not the most important thing, the people managing and working on the project are. When the contract is signed, parties will automatically start to diverge. This needs attention during the project too, so a contract should motivate communication and counteract diversion. The contract creates a safety net, but in an ideal situation, the contract should not be needed. An evaluation of the process when the project is finished could help for future projects.

I4. Joost de Vries

Joost de Vries is a senior contract manager at To Interface. He was involved with the contract management of the ICC. To Interface was hired by the Courtys consortium to do the contract management for the construction.

General questions:

- What is your experience with UAC-IC contracts?

De Vries has been involved with multiple UAC-IC projects. What is striking to UAC-IC contracts, is that they are based on two or more parties opposite to each other, who draw a contract from concessions. UAC-IC contracts usually involve a lot of conflicts and disputes, because there is no real basis of cooperation.

- What is your experience regarding the alliance contract and NEC-ECC contracts?

De Vries has been closely involved with the ICC project, which was carried out under an NEC-ECC contract. He was one of the project's experts regarding NEC3. De Vries represented the consortium during the tender and was asked to stay for the realization of the project.

- What was your role in those projects?

De Vries had the role of contract manager. He was responsible for the compensation events and the discussions regarding the project scope.

- In case you have experience with the types of contracts, can you tell the difference between the contracts in your opinion?

The alliance contract and NEC3-ECC contract have a basis of trust rather than mistrust. When two parties want to have conflicts, this is also possible with NEC3. When two parties want to cooperate, this is also possible with UAC-IC. This means that in the end, the people involved and their attitude towards each other and towards the project might be more important than the contract.

The manner of payment with an NEC3 project is different from a UAC-IC project. NEC has an open book principle, which means that all costs and profits from each party are public to the consortium. This is a big difference from the regular contracts.

The NEC3 contract offers a unique payment system, leading to less costs for the contractors and client. The system shares profits and losses, this makes room for a more efficient building process. This sharing mechanism leads to more cooperation and communication and cost reduction in the end. This system also leads to optimizations and innovations.

- Why are the contracts not being used more often?

It is mainly the fact that NEC3 is an unknown contractual model in The Netherlands. Our construction industry is too conservative and afraid of change. De Vries would like to work with a NEC3 contract more often; the factor cooperation and trust are in every project's interests.

Questions regarding the case projects (International Criminal Court / Isala Hospital):

- In what way was 'trust' a part of the selection of contractors?

Trust was not a formal part of the award criteria for the tender, but the client had a specific view on the contenders' plans, values and vision. This has its effects on the tender.

- Why was the project carried out under an alliance contract / under a NEC3-ECC contract?

The ICC is an international organization, they wanted the tender to be open for foreign contractors as well. The NEC3 contract is familiar to contractors around the world, so there is a lower threshold to join the tender. Unfortunately, only Dutch contractors signed up for the tender.

The second reason for implementing the NEC3 contract, was because a NEC3 contract is more focused on cooperation, which is in line with the company vision of the ICC.

- How was the cooperation between the different companies structured?

A consortium was formed with Visser & Smit Bouw, Boele & Van Eesteren, called Courtys. Homij was involved for the installations as a subcontractor.

Homij and Oskomera were involved in the NEC3 contract in an option A contract, but not all subcontractors were joined in this contract. The involvement of Homij was very big. De Vries states that for that reason Homij could have been a part of the consortium.

- In what way were the subcontractors contracted?

Most of the other subcontractors did not join in the NEC3 contract, but were involved under a regular contract with their respective clients.

- Was the project a success?

The project was a success. I am sure that without the NEC3 contract, we would not have finished in time. Due to the sharing mechanism and the early warning system, they were able to adapt to a new situation on the spot.

- Was the contract part of this success?

The contract was the basis of the success. However, every project needs the right people in order to make it a success in the end. With the ICC and its representatives from the Brink Group, this combination was what made it a successful project.

Questions regarding project control during the case projects:

- Do you know what is meant by 'control mechanisms'? (examples: open book accounting, risk register, project start-up, early warning system, sharing of information)

Yes, although De Vries does not think 'control mechanisms' is the right word for the thing. 'Mechanisms for cooperation' is a more positive substitute. It could also be called 'mechanisms for quality assurance'.

- Which control mechanisms have been applied in the project?

- Adjudicator was active and necessary in the ICC. The involvement of an adjudicator is good, because it refrains parties from going to court. With the UAC-IC, the possible dispute board almost always gets excluded in the project, while this is a certain help in a project. Due to the neutrality and professionalism of such a board, a lot of conflicts can be settled before they have a heavy effect on the project.
- Audits
- Open Book Accounting
- Risk management
- Opportunity management
- Early Warning is required to streamline the project and prevent delays and faults.
- Project Start Up with all stakeholders
- Teambuilding activities

- Were the control mechanisms in the project mostly formal or informal?

Most of the control mechanisms were formal. De Vries states that both formal and informal control mechanisms are required. The informal control mechanisms are very useful to improve on communication. In the end, the team is the most important thing.

- What was the effect of the control mechanisms on the level of trust?

When checking other people's work, it can strengthen the trust relationship when everything turns out to be correct. Especially when the other person does not know about the control taking place. De Vries' experience with audits and checks is that it is common and accepted by everyone and that there is no negative effect of this type of control.
Open book accounting is a control mechanism which does strengthen the level of trust greatly. By making the costs public, there is no room for mistrust.

- Where there any legal disputes?

There have been struggles and disputes, but those are confidential. However, with the set agreements, the involved stakeholders worked it out and were able to continue the project in good cooperation. Changes in the building specifications should only be made when both parties are agreeing on these changes.

Questions regarding trust in construction projects:

- Can you tell me what 'trust' means to you?

Whatever you say is truthful and not self-centered, but with a basis of project interest. It is important for trust to be built, that the trustor can connect with the trustee in openness and honesty.

When you are able to trust your partner, you are more likely to accept something which is positive for project success, even when it is not in something that is in your own interest. It is all about giving and taking, taking of the sharp edges and be reasonable.

- In what way do you think trust can have a negative influence on a construction project?

When involved in a project, it is important to stay focused and never trust someone blind. Especially when a lot of money is at stake, you have to keep checking the other party.

- In what way is trust described in the contract?

Article 10.1 states trust explicitly. This means that the contract can be terminated on the basis of trust. This is a soft and unclear boundary to cross, but it can be useful to have this statement as a boundary condition.

- How could it be described in future Dutch contracts?

There should be one explicit clause regarding trust. Besides, the core of the UAC-IC should be adapted more towards trust and cooperation. Just stating trust like in article 10.1 NEC3, will not result in more trust. Control mechanisms are needed as a tool to build trusting relations in future contracts.

A combination of a financial sharing mechanism and early warning system, will help to build trust.

- Is it needed or desirable to incorporate 'trust' in a contract?

It is desired to have at least more attention to trust in future UAC-IC contracts. When companies can work together in projects with a big trust relationship, they are probably more likely to work together in future projects as well.

De Vries states that his experience regarding the NEC3 contract with the ICC is very positive: the cooperation between different contractors in during the project was of a level he had not yet experienced with other projects. Even though each stakeholder has his own part to play and their interests are not always aligned, both the contractual model and the people involved have made this project a success.

I5. Paul Fondse

Paul Fondse is a senior contract manager at Brink Group. He was involved with the contract management of the International Criminal Court, the client in this project. Fondse has over 30 years of experience as a contract manager in the construction industry.

General questions:

- What is your experience with UAC-IC contracts?

Fondse has done a lot of UAC and AUC-IC projects during his career.

- What is your experience regarding the alliance contract?

Fondse indicates that he has only theoretical knowledge of the alliance contract.

- What is your experience regarding the NEC-ECC contract?

Fondse is considered an expert on NEC3 contracts. He indicates that Brink Group is enthusiastic about the NEC3 family of contracts, because the trust relationship between client and contractor is embedded in the whole contract. The basis of openness, transparency and trust is unique for contracts in general, in most contracts these are not named explicitly in a contract. Trust in the NEC3 is also a means for terminating the contract, this makes for stakeholders to take it seriously and attentively.

Trusting each other and helping each other where needed should be put into practice. Fondse states that is helps to write it down in a contract, however, it should be applied and maintained by all stakeholders. With the ICC project we gave this a lot of attention.

In projects, there is often a conflict between client and contractors. Trust is one of the main issues. The NEC3 contracts provide mechanisms that aim to increase the level of trust, besides from article 10.1. This is lacking in the current UAC-IC contracts. The NEC3 contract compels the different parties to work together and build trust, rather than inciting conflicts.
Also, the traditional contract does not give an incentive to talk openly about building specifications, planning and costs, whereas NEC3 does with the open book accounting.

- In which construction projects have you worked with these contracts?

International Criminal Court in The Hague, regarding the NEC3 contract.

- What was your role in those projects?

Fondse was the contract manager at the ICC project. Fondse was involved from the formulation of the contract and tender and onwards during the project until realization.

- In case you have experience with the types of contracts, can you tell the difference between the contracts in your opinion?

The NEC3 family of contracts has the option for the ECC target contract. This provides the financial incentive for all stakeholders to reduce costs and cooperate on a basis of trust. The open book mechanism is leading in this respect. The UAC-IC has a fixed price principle, this makes room for mistrust and conflicts. The NEC3 contract requires a close cooperation, leading to fewer disputes and problems.

NEC3 as a contract is not very innovative, but it is a standard. The Dutch alliance contracts are reinvented for every project. Fondse thinks the Dutch system lacks a standard for integrated contracts like the NEC3, because the UAC and UAC-IC is based on a fixed price contract.

- Can you explain why construction companies nowadays tend to use more innovative types of contracts rather than the traditional contracts?

In the Dutch construction industry, most conflicts arise from financial issues. The more innovative types of contracts tend to provide guidelines and handles to deal with these conflicts. The traditional contracts do not provide a basis of trust, according to Fondse.

Questions regarding the case projects (International Criminal Court / Isala Hospital):

- How was the tender organized?

The tender was not used to find the most economic beneficial consortium, but the best fit. Fondse states that the most important thing to make a project successful is the team and the people involved. If the people are not able to cooperate, it will never be a success. Therefore, it is more important to make a good selection of people, then the type of contract. The tender process was used to guide this selection of parties.

- In what way was 'trust' a part of the selection of contractors?

In the tender, the teams of the contractors were assessed and evaluated. During the tendering phase, it was already discussed what the cooperation should be like. The assessment was done by the evaluation of documents, but also by meetings with the teams of contractors. Together the involved people went to visit certain projects and discussed their visions on the projects.

- Why was the project carried out under an alliance contract / under a NEC3-ECC contract?

ICC is an international organization. Therefore, they wanted international companies to be able to participate in the tender. The NEC3 contract is internationally recognized type of contract. The project manager from the client was more familiar with the NEC3 contract, so it was decided to use this for the project.

- In what way were the subcontractors contracted?

The main subcontractors were contracted back-to-back in the NEC3 model, the less involved subcontractors were contracted in a more traditional way, but with some NEC3 aspects, like open book accounting.

- Was the project a success?

Yes. Without the NEC3-ECC target price contract it could have been different.

Questions regarding project control during the case projects:

- Do you know what is meant by 'control mechanisms'? (examples: open book accounting, risk register, project start-up, early warning system, sharing of information)

Yes, although Fondse prefers the term 'project management mechanisms', because control might not be applicable to all mechanisms.

- Which control mechanisms have been applied in the project?

  - Early Warning system – This compels stakeholders to warn when a fault or defect is noticed or predicted during the project. By giving a warning, the problems can be handled before they arise. Most of the time, the contractor warns for unexpected things, for example additions and omissions to the building specifications. By giving an early warning, the client and contractor can discuss planning and costs without harming the progress.
  - Open book accounting – Each party has insight into the budgets and costs of the project and other stakeholders. It can be used as an incentive to talk about these things and reduce costs by discussing with each other. A contract that enables the sharing of costs and profits, will help reduce the costs as well, because it provides an incentive to talk about beneficial solutions to possible problems or big expenses.
  - Risk management – this is used to prevent unexpected costs in the project.
  - Project planning evaluation

- Were the control mechanisms in the project mostly formal or informal?

Mostly formal, however, there were a lot of workshops and informal events and meetings like a project start up. Many informal mechanisms should be used in the pre-contractual phase of the project to get to know each other.

- What was the effect of the control mechanisms on the level of trust?

Fondse thinks a financial incentive for all involved parties is very helpful to build trust. This is not applicable to all kinds of projects, but the more time consuming, complex construction projects benefit from a better relationship between client and contractor.

The open book mechanism is still slightly unknown in The Netherlands. Contractors are willing and enthusiastic about the mechanism, mainly because they can generate extra profit and build a strong relationship with the client and partners.

- Where there any legal disputes?

There were some disputes during the process. The NEC3 has a mechanism for adjudication. The adjudicator can be used to hear both parties and has a mediating role in disputes. The aim of this adjudication is to prevent the disputes from going to court and thereby preventing extra costs and delay. Records are being made during this process, if necessary; parties can still go to court.

Fondse thinks this intermediate step between dispute and court is useful to maintain the level of trust.

Questions regarding trust in construction projects:

- Can you tell me what 'trust' means to you?

Trust is translated into several things, of which being able to deal with each other's troubles in cooperation is the most important one.

- What do you think of the following statement? "Trust in the construction industry is important."

Fondse thinks it is very important, however, it should be researched where this culture of mistrust did originate from.

- In what way do you think trust can have a positive influence on a construction project?

When people are able to trust each other, their cooperation will be better. This will lead to better quality, less costs and more successful projects.

- In what way is trust described in the contract?

Clause 10.1 states trust explicitly. It is substantiated by several other clauses and mechanisms. It has an added value to state it explicitly, because this makes it a contractual obligation. However, Fondse has never seen that a contract was terminated by a breach of trust.
The clause helps to maintain a specific mindset for clients and contractors, but if they are unwilling it will never help.

- How could it be described in future Dutch contracts?

The clause stating trust explicitly is not the only thing that is needed. All the other articles should also provide guidelines for a trust relationship between client and contractor. Cooperation should be the main focus. Fondse states that certain control mechanisms, like the target price agreement, open book accounting and early warning system will help to achieve this in practice.

- Is it needed or desirable to incorporate 'trust' in a contract?

The team is more important than the type of contract. The conditions for a good cooperation should be provided in a contract though. The rules and regulation should be discussed during the project. The basis of a fixed price contract differs from the NEC3 contract. In a NEC3 contract, the planning, costs and admissions and omissions are more manageable.

The conditions in a contract should provide a basis of trust. Therefore, it is desirable to incorporate trust in a contract. However, each project is different, therefore each contract should be different and custom fit to the project.

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