



# Flexibility of the DBFM contract

Research into flexibility of DBFM contracts  
for transportation infrastructure

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## Preface

This is a MSc thesis report about flexibility of DBFM contracts for infrastructure projects. I was inspired to go into this topic at last year's *PPS Werkt!* conference at which Infrastructure & Environment's Minister Mrs Schultz van Haegen emphasised the importance of it. Exactly 1 year later Rijkswaterstaat organised this conference again<sup>1</sup> and this time it was its general director Mr Dronkers drawing attention to flexibility of the DBFM contract.

At the same time, at this year's conference I presented a poster to share the results and ideas of this research project with those that should be interested in it. Though this report presents and shares those conclusions and recommendations too, I advise the construction sector to undertake action now. Don't talk about flexibility, just do it. Think of solutions and try them. Don't wait and see what comes, becomes I believe the 'worst' is yet to come.

I would like to thank those that have contributed to this research both directly and indirectly. Of course Mr Hertogh, thank you for your personal dedication and for being so enthusiastic about the topic of this research. Mr Hombergen, due to your network I went to London as you have put me into contact with the Highways Agency – and with so many employees from Rijkswaterstaat too. And Mr Hobma, as a result of your strong methodological background I managed to turn this report into an academic writing.

Michiel, I found our meetings amazingly insightful and cryptic at the same time. Thank you for your sharp analyses. And, Renout, thank you for reading my writings over and over. Now you have 'free' time again, of which I am sure you will think of a new project.

Further, what I liked most of doing research was listening and discussing with professionals and friends. Therefore, many thanks to the interviewees, without whom there would be not thesis. Further, very special thanks to my respondents of the Highways Agency and EC Harris in London and Bedford. I had a wonderful and informative few days with you.

And last but not least, my friends and future colleagues of Arcadis Infraconsult; it was an honour to have 20 supervisors. Each and every one of you has a practical and simultaneously academic approach with which you exactly represent what I expected from a graduation internship.

**Janneke Roosjen**

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<sup>1</sup> 30 May 2012 and 2013, Fokker Terminal The Hague (NL).

## Summary

Recently, in the construction industry a shift is taking place from conventional contracts models, in which the client has the responsibility for the (re)design of an asset, to integrated contract models in which the role of the client is much more limited. Further, in integrated models for road infrastructure, projects are contracted for the whole life cycle of the road; and more design freedom is given to the contractors of the project; also, private investors finance those projects more and more; and finally, those contracts tend to be negotiated for longer terms. The DBFM contract is such a model.

**DBFM** stands for 'design, build, finance and maintain' and since 1999 this contract model has been increasingly applied by the Dutch government because it is believed to deliver value for money. However, this new type of contract is said to be (relatively) **inflexible**. Not only in the Netherlands but also in the United Kingdom, where similar types of contracts (DBFO) are administered by the English equivalent of Rijkswaterstaat, the Highways Agency. Usually, DBFM and DBFO contracts, in which O stands for operate, have a term of about 15 to 30 years.

Inflexibility of the DBFM contract is believed to be a problem for the public sector client, such as Rijkswaterstaat or ProRail, who is worried that public resources are tied up that could also be used elsewhere. It is worried because it is unknown whether the DBFM contract can put changing circumstances, which by definition exist as the project's context is dynamic, into effect. This is particularly an issue for changing circumstances in the long term, because the longer the contract runs the more uncertainties there are at the outset of the project.

In literature is suggested that **flexibility** of the DBFM contract is provided by **the change procedure**. This is a mechanism in the DBFM contract through which both physical changes in the asset and changes in the contract's terms can be made. These changes can be initiated either by the client or the commissionee.

Therefore, in this research is investigated what flexibility is offered by the change procedure in the DBFM contract for Dutch transportation infrastructure projects that have been issued the completion certificate. Moreover, as it is observed that it is unknown how the interests of the main actors in the DBFM project play a role in making changes and in flexibility, this is studied too. The **central research question** is:

*What flexibility is offered by the change procedure in the DBFM contract for Dutch infrastructure projects and how do the interests of the contracting parties and the financiers of DBFM play a role therein?*

The **research objective** is to propose recommendations for improving the DBFM approach of infrastructure projects.

To reach that research objective the project has been divided into three phases. Phase 1 is the literature study, on basis of which an analytical framework is established. It includes 4 propositions (see below). In phase 2, which is divided into three parts, respectively changes in case projects are identified and characterised by means of a case study research (2<sup>a</sup>); the interests of the contracting parties and the financiers are analysed (2<sup>b</sup>); and the experience with flexibility of DBFO projects in England is assessed (2<sup>c</sup>). The projects that were selected for the case study research are three road projects, namely the A59, A12 motorways and the N31 highway, and one rail project, the HSL-Zuid. These are 4 Dutch transportation infrastructure projects which have reached the projects' completion date, which means that the commissionee



has finished realisation and now has to 'exploit' the asset<sup>2</sup>. Finally, in phase 3 by means of an analysis of the data the research question is answered and the recommendations for improving the DBFM approach is presented.

### The literature study

In general, flexibility of the DBFM contract is a useful adaptation mechanism to deal with uncertainty over the term of the contract. Though flexibility is a 'concept' it is concluded that a flexible contract should in principle be prepared for a change and is characterised by options in the contract. This means that the contract can be employed differently and that flexibility is an 'engineering task' as it must be put in purposely.

The following 4 propositions are drawn to describe what flexibility of the DBFM contract. They provide for a blueprint for study and for analysing the case study evidence:

#### I. The more changes are made the more flexible the DBFM contract is

Hamdan, Van Baekel et al. (2011), who did an assessment of the DBFM model, concluded that if changes are put through the procedure the goal of flexibility, effecting changing circumstances, is 'achieved'. Therefore, in this research at the outset it is assumed that the more changes can be made, the more flexibility there is.

#### II. There is flexibility of the DBFM contract if there is little penalty in time, costs, effort or performance

Upton (1995) defines flexibility as **the "ability to change or react [to changing circumstances] with little penalty in time, effort, cost or performance"**. For the change procedure this means that there should be little 'penalty'<sup>3</sup> in those 4 aspects in the changes according to the contracting parties (the client and the commissionee) as these can propose and conclude changes.

#### III. There is less flexibility for the commissionee than for the client due to the 'watchdog' role the financiers fulfill in the DBFM model

DBFM projects are privately financed. The financiers provide for debt equity before and during the realisation phase of the project, in return for redemption of that debt equity plus interest over the life time of the project. Due to the involvement of the financiers the DBFM organisation is more complex than the organisation of the 'traditional' contract. And as the financiers in principle have an agreement with the SPC it is expected that the commissionee is limited in the flexibility it has for putting into effect changing circumstances.

#### IV. The DBFM contract is not flexible if change proposals are rejected

A priori is expected that changes that are withdrawn, or rejected, indicate a degree of flexibility too, as it might imply that (types of) changes cannot be accommodated by the change procedure and thus therewith by the DBFM contract. Such (types of) changes have a large value for example.

<sup>2</sup> It is seen that 'maintenance' phase is not a sufficient term for describing the period after the DBFM contractor has completed the realisation of the project, because the commissionee maintains the asset already in the realisation phase. Although DBFM does not include 'exploitation' officially, the term is used to indicate the period as described above.

<sup>3</sup> This is a 'penalty' as described in the definition, read: 'pain' or 'disadvantage' This penalty should not be confused with 'penalty points' in the sense of a performance correction.

## Results and analysis

In phase 2<sup>a</sup> 8 interviews were held with one or more representatives of both the client and the commissionee in the 4 case projects, those representatives being contract, risk or operation managers.

### The changes in the case projects

The changes in the case projects were divided in a number of categories, namely into changes by origin, value, impact and type. These can be seen in Table 1.

	A59	N31	HSL-Zuid	A12
Contract close	Feb 2003	Dec 2003	Dec 2001	July 2010
Completion	Jan 2006	Dec 2007	Dec 2006	March 2013
Number	14	7	64	1
Changes cancelled	1	0	5	0
Total value of changes	Ca. €600,000	Ca. €200,000	Ca. €48M for 7	Ca. €2 mio
Initiator	Client change	0	7	64
	Commissionee change	1	0	0
	Other	13 third parties	0	0
Origin	Internal	1	0	0 of 7 known
	External	13	7	7 of 7 known
Value	Below threshold	5	4	Ca. 10%
	Above threshold	7	3	Ca. 90%
	Other	2 n.a. as in negotiation	0	0
Impact	Financial only	1	1	0 of 7 known
	Works and services	13	6	7 of 7 known
Type	Use or functionality	13	5	6 of 7 known
	Service or performance standards and specifications	1	1	1 of 7 known
	Other	0	1 procedural	0

Table 1 Characteristics of changes in the case projects since the projects' completion date

From the case studies and the results in Table 1 is observed that the number of changes in the rail project is much higher than in the road projects (64 of total 86); further, that changes have an **external origin** largely (95%); thirdly, that the value of the changes in the exploitation phase of the case projects differs; fourth, changes often have an impact on the works and services; and finally, changes mostly have a functional purpose.

### The interests of the contracting parties and the financiers

In phase 2<sup>b</sup> the research aims at gaining an insight in the interests of the contracting parties and the financiers. Thereto 8 'open' interviews are held with employees from Rijkswaterstaat, Dutch contractors and legal and financial advisors. These interviewees are 'independent' from the case projects, as they do not have a (direct) relationship with the case projects.

It is observed that **the involvement and the interests of the financiers have a bearing on the behaviour of the contracting parties in general**. That is because financiers focus on a stable cash flow of the DBFM project, which is generated by the fee that the commissionee receives if the infrastructure asset is available for use. A change can influence that height of the availability fee. Therefore, financiers are particularly interested in the payment they receive from the SPC, also because the financiers have financial agreements with other investors which they

have to honour. In that respect one could say that financiers have the same interests as the commissionee: make sure that income is generated.

From the above becomes clear that the role the contracting parties have influences their attitude to risk. This is because changes can have (positive and negative) consequences for the performance and the availability of the asset that in turn can decrease the cash flow of the project.

### Analysis of the propositions

From the analysis is concluded that **none of the 4 propositions holds true completely**. At first, the quantity of changes is an indicator of the dynamics of the project's context, for example politics and stakeholders, which causes changes. Therefore changes (solely) do not say anything about the flexibility there is (**proposition I**). Further, only the aspects of time, costs, effort and performance of the change procedure do not indicate whether the DBFM contract is flexible. It is observed that to a large extent the contract is flexible through the change procedure if the employees of the contracting parties are willing to change (**proposition II**). With respect to **proposition III** the analysis shows that the financiers have no direct interest in changes. However, their involvement reduces flexibility both for the commissionee and, more important, for the client. Lastly, whether changes are rejected is not an indicator of flexibility. Rejection is an indicator of on which contractual or legitimate grounds the parties can refuse a proposal (**proposition IV**).

### Conclusions

The conclusion to the central question of this research is that the change procedure provides **the flexibility to put into effect minor changes** in the DBFM contract, at least in the 4 projects. However, in those case projects no major changes occurred. And because in England there is only little experience with major changes too, from this research it is yet unknown how the DBFM contract can put those into effect.

Moreover, in this research is observed that flexibility is a rather 'non-distinct' ability of the DBFM contract and therefore cannot be regarded from one viewpoint or perspective only. Moreover, besides the change procedure, two extra **dimensions** are discerned in this research, which allow for a certain degree of flexibility of the DBFM contract, namely:

#### 1. Flexibility of the DBFM contract depends on interpersonal flexibility

Whether changes can be put into effect, depends on **the contracting parties' willingness to grant concessions**. Therefore, at the same time, the flexibility of the DBFM contract is determined by the degree of interpersonal flexibility of the contracting parties' employees.

#### 2. Take into account the contracting parties' perspective in flexibility

Secondly, whether there is flexibility of the DBFM contract is dependent on whose perspective is taken: the client's, the commissionee's or the financiers' viewpoint. This is because **'inflexibility' is particularly a 'problem' for the client**.

### Recommendations

The objective of the research was to propose for recommendations for the DBFM approach to infrastructure projects. Taking into account the roles and interests of the contracting parties and the financiers, the following recommendations for the DBFM approach on Dutch infrastructure projects are made.

#### 1. Focus on (interpersonal) collaboration instead of the change procedure

Due to the fact that the change procedure is particularly only a formalisation process of issues that are discussed before they enter the procedure, and because of the fact that flexibility of the DBFM contract is partly determined by the interpersonal flexibility, it is recommended that the contracting parties focus on their interpersonal collaboration, rather than on the contract, which is a juridical measure.

#### 2. Increase the parties' (real) understanding of each other's perspectives

The general belief is that the knowledge gap that exists for flexibility of the DBFM can be decreased when the contracting parties realise that flexibility for the one does not have to imply flexibility for the other.

#### 3. Draw scenarios for major changes

Although real major changes have not occurred in the case projects, and because there is only little experience with major changes in England yet, there exists a solution space to those major changes. These can form a basis for drawing scenarios for major changes, which is necessary because it is believed that only very few people have an idea of how to put those changes into effect effectively and efficiently.

#### 4. Don't apply DBFM if scope is unclear or if causes of changes cannot be mitigated

In certain situations the DBFM is not applicable, which is when the causes of major changes cannot be mitigated, and when the scope of the DBFM project is unsure. Of course, DBFM can be applied in those situations, however, due to the disadvantages of the change procedure, it is expected that the contract does not deliver the value for money which it aims for.

#### 5. Engineer flexibility at the outset of the project

As it was observed in the transportation infrastructure case projects that changes in the exploitation phase require time, money and effort, engineering flexibility in the procurement phase in the contract and the project, is a method to reduce those disadvantages.

#### 6. Track and assess changes in current and future DBFM projects

In order to build a pattern of changes, up and until the contract's end date and thereafter, which is recommended, clients should keep track of and assess changes in current and future DBFM projects, as to be able to assess the decrease in the added value of utilising DBFM contracts.

#### 7. Include a change budget: the project's context is per definition dynamic

By knowing what types and how many changes are likely to occur, following the previous recommendations towards the DBFM approach, the contracting parties should have an increased insight in the budget(s) they should reserve for changes, as the project's context is per definition dynamic.

#### 8. Improve the change 'procedure'

Finally, in this research is observed that in none of the case projects the interviewees directly expressed their dissatisfaction towards the change procedure. Therefore, there is a general belief that the change procedure is sufficient for putting changing circumstances into effect. However, some observations were made that can improve the procedure, which was observed to be a formal process only.

## Samenvatting

Op het moment vindt er in de bouwsector een verschuiving plaats van 'traditionele' contracten waarin de opdrachtgever de verantwoordelijkheid heeft voor het (her)ontwerp van een asset, naar zogenaamde geïntegreerde contracten, waarbij die verantwoordelijkheid meer en meer wordt overgenomen door de opdrachtnemer. In die geïntegreerde contracten worden projecten voor de levensduur van het asset uitbesteed; krijgen de opdrachtnemers meer ontwerp-vrijheid en is daarmee de rol van de opdrachtnemer beperkter; worden die projecten steeds vaker gefinancierd met geld van de private sector; en hebben de contracten tot slot een langere looptijd. Het DBFM contract is hier een voorbeeld van.

**DBFM** staat voor 'design, build (samen ook wel 'realisatie' genoemd), finance and maintain'<sup>4</sup>. Sinds 1999 wordt dit contractmodel toegepast door de Nederlandse overheid. Echter wordt dit type contract **inflexibel** gevonden. Niet alleen in Nederland, maar ook in het Verenigd Koninkrijk, waar het min of meer vergelijkbare DBFO contract wordt toegepast door *the Highways Agency*.

DBFM contracten hebben een looptijd van 15 à 30 jaar. Als gevolg daarvan legt de publieke opdrachtgever, zoals Rijkswaterstaat of ProRail, haar geld vast voor een lange periode, waardoor inflexibiliteit van DBFM contracten voornamelijk een zorg is voor de overheid. Omdat nog maar weinig DBFM projecten in de exploitatiefase zijn, is het onduidelijk hoe DBFM contracten veranderende en/of veranderde omstandigheden, die per definitie bestaan omdat de context van het project dynamisch is, effectueert. In het bijzonder is dit onduidelijk voor de omstandigheden die op de lange termijn veranderen, omdat er door de lange looptijd meer onzekerheden bestaan aan het begin van het project.

In de literatuur wordt aangegeven dat flexibiliteit wordt geboden door de **wijzigingsprocedure**. Dat is een procesafpraak in het DBFM contract, waarmee bepalingen in het contract kunnen worden aangepast, en ook fysieke aanpassingen in het asset kunnen worden gedaan. Daarom wordt met dit onderzoek gekeken naar de flexibiliteit die de wijzigingsprocedure biedt in DBFM contracten voor transportinfrastructuur projecten in de exploitatiefase. Omdat verder is geconstateerd dat nog onbekend is hoe de belangen van de belangrijkste actoren in het DBFM project een rol spelen in het maken van wijzigingen en in flexibiliteit, wordt ook daar onderzoek naar gedaan. De **centrale onderzoeksvraag** is:

*Welke flexibiliteit biedt de wijzigingsprocedure in het DBFM contract voor Nederlandse infrastructuurprojecten, en hoe spelen de belangen van de contractpartijen en de financiers van DBFM daarin een rol?*

Het **doel van het onderzoek** is om aanbevelingen te doen die de DBFM aanpak voor infrastructuur in Nederland kunnen verbeteren.

Om dat doel te bereiken is dit onderzoek in drie delen verdeeld. In fase 1 wordt een literatuurstudie gedaan, waaruit 4 proposities, die als leidraad voor de rest van het onderzoek fungeren, zijn opgesteld.

Fase 2 is verdeeld in drie delen. In fase 2<sup>a</sup> worden, door middel van een case study research, in 4 case projecten de wijzigingen bestudeerd en ingedeeld in categorieën. Dan worden in fase 2<sup>b</sup> de belangen van de contractpartijen en de financiers met betrekking tot wijzigingen en flexibiliteit geanalyseerd. En in fase 2<sup>c</sup> wordt de Engelse ervaring met flexibiliteit van DBFO projecten vergeleken met de wijzigingen en flexibiliteit in Nederland.

<sup>4</sup> Nederlands: ontwerp, bouw, financiering en onderhoud.

De case projecten zijn 3 wegebouwprojecten en een spoorproject, te weten de A59, N31 en de A12, en de HSL-Zuid. Dit zijn vooralsnog de enige 4 Nederlandse transport-infrastructurele projecten die voltooid zijn, i.e. die zich in de onderhoudsfase bevinden.

In fase 3 wordt de data die in fase 2 is verzameld geanalyseerd en vertaald in conclusies: de antwoorden op de onderzoeksvragen. Hier worden ook de aanbevelingen gedaan.

### De literatuurstudie

Uit de literatuurstudie is geconcludeerd dat 'flexibiliteit' het aanpassingsvermogen is van het DBFM contract om met (bekende en onbekende) onzekerheden om te kunnen gaan. 'Flexibiliteit' is een concept, en er wordt geschreven dat iets dat flexibel is, veranderingen kan ondergaan zonder dat het zelf verandert. In dat opzicht moet een flexibel DBFM contract dus voorbereid zijn op veranderingen door middel van opties die in het contract zijn ingebouwd. Zo kan bij veranderde of veranderende omstandigheden het contract anders worden gebruikt.

Met de volgende 4 proposities wordt gedefinieerd wat flexibiliteit van DBFM contracten inhoudt:

#### I. Hoe meer wijzigingen er gemaakt kunnen, hoe flexibeler het DBFM contract is

Hamdan, Van Baekel et al. (2011) concludeerden dat in het algemeen 'het overkoepelende doel' van flexibiliteit van het DBFM contract is bereikt, omdat er in een aantal projecten al 'veel' wijzigingen waren doorgevoerd. Dat doel is: het effectueren van veranderde omstandigheden. Daarom wordt in dit onderzoek aangenomen dat het aantal wijzigingen een indicator is van de mate van flexibiliteit van het DBFM contract.

#### II. Er is flexibiliteit in het DBFM contract als er weinig 'pijn' is in termen van tijd, geld, moeite en uitvoering (van de wijzigingsprocedure)

Hoewel 'flexibiliteit' een niet-eenduidig begrip is, wordt een 'gekwantificeerde' definitie van flexibiliteit geboden door Upton (1995), namelijk dat het **de "ability to change or react [to changing circumstances] with little penalty in time, effort, cost or performance"** is. Deze definitie wordt daarom in dit onderzoek toegepast op de wijzigingsprocedure. Er wordt dus aangenomen dat het DBFM contract flexibel is, als er weinig of minder dan weinig 'pijn' in termijn van tijd, geld, moeite en uitvoering van het doorvoeren van wijzigingen door de wijzigingsprocedure voor de contractpartijen is.

#### III. Er is minder flexibiliteit voor de opdrachtnemer dan voor de opdrachtgever ten gevolge van de 'waakhondfunctie' van de financiers in het DBFM model

Een belangrijk kenmerk van DBFM is dat de projecten worden gefinancierd met geld van de private sector. Dit betekent dat financiers, zoals banken, zorgen voor vreemd vermogen waarmee de opdrachtnemer de realisatie van het project kan uitvoeren. Nadat het project is voltooid ontvangt de opdrachtnemer een vergoeding van de opdrachtgever en lost hij de lening, inclusief rente, af. Als gevolg van de inmenging van financiers is het DBFM contract complexer dan traditionele contracten. De financiers hebben een overeenkomst met de Special Purpose Company (SPC) en daarom wordt verwacht dat dit de flexibiliteit van de opdrachtnemer beperkt.

#### IV. Het DBFM contract is niet flexibel als wijzigingsvoorstellen worden afgewezen

Ten laatste wordt aangenomen dat het afwijzen of terugtrekken van wijzigingen door één van de contractpartijen iets zegt over de mate van flexibiliteit. Er wordt namelijk verwacht dat dit impliceert dat een bepaald type wijzigingen niet kan worden geaccommodeerd door de wijzigingsprocedure in het DBFM contract.

## Resultaten en analyse

Voor het verkrijgen van de wijzigingen, zijn in fase 2<sup>a</sup> in de case projecten 8 interviews gehouden met één of meerdere vertegenwoordigers van zowel de opdrachtnemer als opdrachtgever. De vertegenwoordigers waren contract, risico en operations managers.

### De wijzigingen in de 4 case studies

De wijzigingen zijn ingedeeld in categorieën, namelijk in wijzigingen in initiator, herkomst, waarde, gevolgen en type. Zie Table 2.

	A59	N31	HSL-Zuid	A12
Contract datum	Feb 2003	Dec 2003	Dec 2001	Juli 2010
Voltooiing	Jan 2006	Dec 2007	Dec 2006	Maart 2013
Aantal wijzigingen sinds voltooiing	14	7	64	1
Wijzigingen teruggetrokken	1	0	5	0
Totale waarde wijzigingen	Ca. €600,000	Ca. €200,000	Ca. €48M voor 7	Ca. €2 mio
Initiator	Wijziging opdrachtgever	0	7	64
	Wijziging opdrachtnemer	1	0	0
	Anders	13 derden	0	0
Herkomst	Intern	1	0	0 van 7
	Extern	13	7	7 van 7
Waarden	Onder drempelbedrag	5	4	Ca. 10%
	Boven drempelbedrag	7	3	Ca. 90%
	Anders	2 n.b. want in onderhandeling	0	0
Gevolgen	Enkel financieel	1	1	0 van 7
	Werk en dienstverlening	13	6	7 van 7
Type	Gebruik van functionaliteit	13	5	6 van 7
	Diensten of prestatie-eisen	1	1	1 van 7
	Anders	0	1 procedureel	0

Table 2 Kenmerken van wijzigingen in de exploitatiefase van de 4 case projecten in Nederland (n.b. = niet beschikbaar)

Er kan geconcludeerd worden dat het aantal wijzigingen in het spoorproject significant hoger is dan in de wegenbouwprojecten (64 van in totaal 86 wijzigingen). Verder hebben de meeste wijzigingen een **externe herkomst** (95%). Ten derde lopen de bedragen van de wijzigingen sterk uiteen. Ook hebben de wijzigingen in deze projecten gevolgen voor het werk of de diensten, omdat ze voornamelijk de functionaliteit of het gebruik aanpassen en/of optimaliseren.

### De belangen van de contractpartijen en de financiers

In fase 2<sup>b</sup> werden 8 interviews gehouden met medewerkers van contractpartijen, financiers en financieel en juridisch adviseurs. Zij hebben geen (directe) relatie hebben met de case projecten en zijn daarmee 'onafhankelijk'.

Uit die interviews is geconcludeerd dat geen van de 3 actoren *incentives* heeft voor het voorstellen en maken van wijzigingen. Echter, de betrokkenheid van de financiers beperkt de 'vrijheid' van de contractpartijen als het gaat om de wijzigingsprocedure. Dat komt omdat financiers geïnteresseerd zijn in een stabiele cashflow, die ontstaat als de opdrachtnemer de beschikbaarheidsvergoeding ontvangt van de opdrachtgever. Een wijziging kan invloed hebben op die vergoeding. Financiers zijn daarom gericht op de betaling door de SPC, waarmee de financiers hun eigen lening moeten afbetalen. In dat opzicht hebben de opdrachtnemer en de financiers hetzelfde belang: inkomen genereren.

Daarmee wordt duidelijk dat de rol die de contractpartijen hebben invloed heeft op hun houding ten opzichte van risico's. Wijzigingen hebben (voordelige en nadelige) consequenties voor de prestatie en beschikbaarheid van het asset, waarmee de beschikbaarheidsvergoeding kan verminderen.

### Analyse van de proposities

Uit de analyse van de resultaten blijkt dat **elk van de 4 hypothesen moet worden verworpen**.

#### I. Hoe meer wijzigingen, hoe flexibeler het DBFM contract is

Het aantal wijzigingen is een **indicatie van de dynamiek** van het project, zoals de invloed van de politiek en de omgeving, die om wijzigingen vraagt. Op zich zegt het aantal wijzigingen daarom niks over de flexibiliteit die de procedure biedt.

#### II. Er is flexibiliteit in het DBFM contract als er weinig 'pijn' is in termen van tijd, geld, moeite en uitvoering (van de wijzigingsprocedure)

Hoewel er in elk van de case projecten gevolgen waren in tijd, geld en moeite voor wijzigingen, werd geconstateerd er desalniettemin geconstateerd dat er flexibiliteit was. Voor een groot gedeelte hangt de flexibiliteit af van of de **medewerkers van de contractpartijen bereid zijn** om aanpassingen te doen.

#### III. Er is minder flexibiliteit voor de opdrachtnemer dan voor de opdrachtgever als gevolg van de 'waakhondfunctie' van de financiers in het DBFM model

**Financiers hebben geen direct belang** in wijzigingen. Hun betrokkenheid zorgt echter voor verminderde flexibiliteit van zowel de opdrachtnemer als de opdrachtgever.

#### IV. Het DBFM contract is niet flexibel als wijzigingsvoorstellen worden afgewezen

Dit is geen indicator van de flexibiliteit van het DBFM contract. Namelijk, het geeft aan op basis van welke gronden partijen wijzigingen terugtrekken of annuleren. De **wijzigingsprocedure is slechts een formalisatieproces**, en wijzigingen worden al voor de procedure besproken, waardoor het aantal wijzigingen dat kan worden geannuleerd überhaupt veel kleiner is.

## Conclusies

Het antwoord op de centrale vraag is dat de wijzigingsprocedure (voldoende) flexibiliteit biedt om **kleine wijzigende en/of gewijzigde omstandigheden te effectueren**, in de case projecten. Echter, in deze 4 projecten zijn tot nog toe geen grote wijzigingen opgetreden. Omdat er in Engeland ook nog maar weinig ervaring is met grote wijzigingen, kan uit dit onderzoek niet worden geconcludeerd hoe het DBFM contract daarmee om gaat.

Verder is in het onderzoek geconstateerd dat 'flexibiliteit' geen eenduidig begrip is, en dus kan de flexibiliteit van het DBFM contract niet vanuit één enkel perspectief worden bekeken. Daarom is geconcludeerd dat er, naast de wijzigingsprocedure, **meerdere dimensies** bestaan die de flexibiliteit van het contract bepalen, namelijk:

#### 1. Flexibiliteit van het DBFM contract wordt mede bepaald door de mate van interpersoonlijke flexibiliteit

Of wijzigingen kunnen worden geëffectueerd, hangt mede af van de projectmedewerkers van de contractpartijen, en of zij bereid zijn concessies te doen.

#### 2. Beschouw het perspectief van de contractpartijen in flexibiliteit

Ten tweede wordt de flexibiliteit van het DBFM contract bepaald door het gekozen perspectief: dat van de opdrachtgever, de opdrachtnemer, of dat van de financiers. Dit



is belangrijk omdat is gebleken dat de negatieve gevolgen, vooral in tijd en kosten, voor rekening komen van de opdrachtgever.

## Aanbevelingen

Het doel van dit onderzoek is het doen van aanbevelingen voor de DBFM aanpak voor infrastructuur projecten. Wanneer de belangen van de contractpartijen en de financiers in ogenschouw worden genomen, stelt dit onderzoek de volgende aanbevelingen voor:

### 1. Focus op interpersoonlijke samenwerking, niet op de wijzigingsprocedure

Omdat de wijzigingsprocedure eigenlijk alleen een formalisatieproces is waarmee wijzigingen kunnen worden 'afgetikt' en omdat de flexibiliteit van het DBFM contract voor een gedeelte wordt bepaald door de interpersoonlijke en inter-organisatiele flexibiliteit, is aanbevolen dat de contractpartijen zich daarop richten. Niet op de wijzigingsprocedure in het contract, omdat dit slechts een juridisch 'instrument' is.

### 2. Vergroot het werkelijke begrip van de partijen voor elkaars belangen

Er was geconstateerd dat er nog niet veel bekend is over flexibiliteit van DBFM contracten en er daarom een *knowledge gap* is. Die kan worden verkleind als de partijen elkaars belangen inzien. Dit betekent dat partijen moeten handelen naar het feit dat als er flexibiliteit is voor de ene partij, er dan niet altijd flexibiliteit hoeft te zijn voor de andere partij.

### 3. Stel scenario's op voor grote wijzigingen

Hoewel er nog geen grote wijzigingen zijn gemaakt, en omdat er in Engeland nog maar weinig ervaring is met grote wijzigingen, bestaan er al wel oplossingen voor. Deze oplossingen kunnen een basis vormen om scenario's voor grote wijzigingen op te stellen. Dit is nodig omdat nog maar weinig mensen een idee hebben over hoe zij, en het DBFM contract, om op een effectieve en efficiënte manier kunnen omgaan met grote wijzigingen.

### 4. Pas DBFM niet toe als de scope onzeker is, of als de gevolgen niet kunnen worden gecompenseerd

Er is geconstateerd dat het niet wenselijk is dat DBFM in bepaalde situaties wordt toegepast, namelijk, wanneer de scope van het project in de aanbesteding al onzeker is, en wanneer de oorzaak van grote wijzigingen niet kan worden gecompenseerd. Natuurlijk kan DBFM worden toegepast, echter, vanwege de negatieve gevolgen van wijzigingen, wordt verwacht dat de beoogde meerwaarde van DBFM daarmee teniet wordt gedaan.

### 5. Bouw flexibiliteit aan het begin van het project

Omdat is gezien dat wijzigingen in de exploitatiefase van de case projecten relatief negatieve gevolgen hebben in tijd, geld en moeite, is het aan te bevelen om flexibiliteit een goede basis te geven en dat al in de aanbestedingsfase te voorzien.

### 6. Monitor de wijzigingen in huidige en toekomstige DBFM projecten

Het is aanbevolen om bij te houden welk partoon van wijzigingen optreedt in de DBFM projecten, tot en met de einddatum van de contracten, en ook daarna, om zo de beoogde meerwaarde te evalueren.

### 7. Neem een wijzigingsbudget op: omstandigheden wijzigen per definitie

Op basis van de vorige aanbeveling is het vervolgens voor de contractpartijen aan te raden om een wijzigingsbudget in het project op te nemen, omdat het zeker is dat

omstandigheden wijzigen. Als men een beter beeld heeft van de wijzigingen die optreden, kan daar meer ruimte voor gehouden worden.

## 8. Verbeter de wijzigingsprocedure

In principe is geen van de partijen ontevreden over de wijzigingsprocedure ansich. Dit heeft te maken met het feit dat het een formalisatieproces is (zie eerder). Er is echter een aantal punten genoemd die verbeterd zouden kunnen worden.

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Figure 1 Tweede Coentunnel and Westrandweg DBFM project, Amsterdam (NL) (Wegenruimte 2011)

# 1 Introduction

The DBFM contract is only recently being utilised in the Netherlands, compared to for example the United Kingdom, and therefore relatively little is known about the flexibility of the DBFM contract. However, 'inflexibility' is observed as a limitation. Therefore, the objective of the research is to propose recommendations that can improve the DBFM approach on Dutch infrastructure projects, by means of identifying and characterising changes on the longer term in transportation infrastructure projects in the Netherlands and the interests of the contracting parties that play a role.

## 1.1 Introduction to the subject

In every country infrastructure services are of importance because they are constructed to fulfil many of our basic societal needs (De Haan 2011). Examples of infrastructures are transportation, power and gas networks, telecommunications, water supply and sanitation (Kessides and Ingram 1995:16,17). This thesis focuses on transportation infrastructures, to be precise: on roads and railways.

Infrastructure such as the road network is necessary for consumption and (economic) productivity and therefore infrastructure systems represent a large share of a country's economy. According to Hertogh and Westerveld (2010:15) transportation networks in particular "are needed to enable modern economies to create wealth and employment".

### 1.1.1 Who has the responsibility for infrastructures?

In order to provide efficient and effective networks in many countries the public sector is responsible for infrastructure. In the Netherlands *Rijkswaterstaat* operates and develops the road and waterway networks on behalf of the ministry of Infrastructure & Environment. Similar international authorities are the Highways Agency in England, the *Dirección General de Tráfico* in Spain and the *Direction Générale des Infrastructures, des Transports et de la Mer* in France.

### 1.1.2 From UAV 1989 to UAV-GC 2005 for construction projects

'Construction' is the process of building infrastructure. In the Netherlands a client such as *Rijkswaterstaat* signs a contract with a commissionee that is willing to undertake the building project. Such a contract is an agreement between two or more parties that have a legal consequence from which obligations originate. Liability ensues from those obligations. Third parties are persons or organisations who are not directly party to the agreement. (Boot, Bruggeman et al. 2008:1)

The Uniform Administrative Conditions for the Execution of Works 1989 (UAV 1989) are drawn up for the 'traditional' relationship between the client and the commissionee. Those 'traditional' building contracts are characterised by the client who first hires one or more consultants such as an architect to create a design before a contractor executes it. In the agreement with this contractor the client is responsible for the design. (Boot, Bruggeman et al. 2008:26,57)

Recently a shift from that contract model to so-called integrated contract models is taking place. The Uniform Administrative Conditions for integrated contracts 2005 (UAV-GC 2005) prescribe that the role of the client is much more limited than in the 'traditional' model. In an integrated contract the commissionee is responsible for several aspects of the building process. See Figure 2.

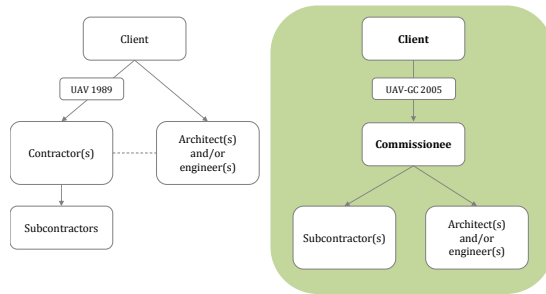


Figure 2 The 'classic triangle' of the 'traditional' contract (left) versus the integrated contract (right) (free from Boot, Bruggeman et al. 2008:57,109)

The set of trends that steers away from 'traditional' contracts is recognised by Altamirano (2010:6) for road infrastructure contracting, namely:

1. Projects are contracted for the whole **life cycle** of the road
2. Increasingly more **design freedom** is given to contractors
3. More and more **private investors** finance projects, and
4. Contracts tend to be negotiated for **longer terms**

A mix of these trends leads to a variation of integrated contract models, see Figure 3. Each of these trends applies to the DBFM model. DBFM is a contract in which the design, build<sup>5</sup>, finance and maintenance of the infrastructure asset is captured in one single contract, hence the term 'integrated' contract.

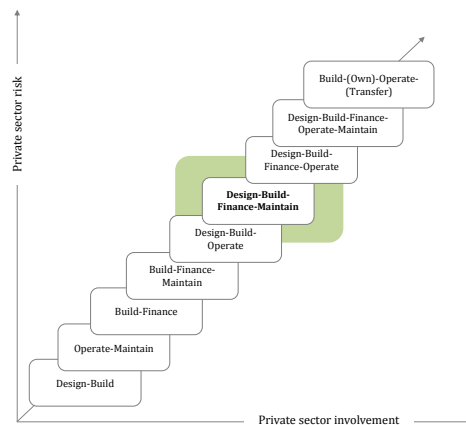


Figure 3 'Scale' of integrated contract models (free from Altamirano 2010:96)

Integrated contracts, including the DBFM contract, can be referred to as Public-Private Partnerships (PPP's). In literature it is argued that there are two types of PPP's, namely the concession and the alliance model. In the concession model there is a (hierarchical) client – commissionee relationship. Amongst other things this means that the client is to exert control

<sup>5</sup> Often 'design & build' is referred to as 'realisation'.

and the commissionee is focused towards construction. Moreover responsibilities and risks between the contracting parties are distributed instead of shared. In the alliance model risks, responsibilities and resources are shared between the public and the private party and there is joint final responsibility. From an analytical point of view the DBFM model is a concession contract. (Hobma 2009)

Winch (2006:29) however argues that in the concession the commissionee should operate a "facility for a pre-defined period, the capital investment being repaid through the revenue stream generated by the operation of the facility". The DBFM model does not include that. Further Altamirano (2010:98, after Cox et al. 2002) notes that performance contracts, which reward a commissionee on basis of results rather than on deliverables, are being applied in Europe by amongst others DB and DBFM. In this thesis therefore it is assumed that the concession and the DBFM contract are not part of the same type of PPP, see Figure 4.

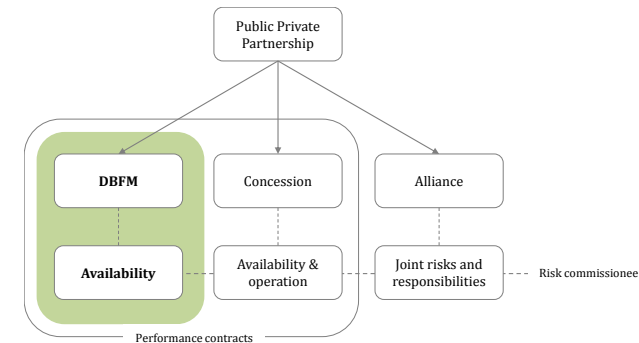


Figure 4 Types of Public Private Partnerships

### 1.1.3 The history of DBFM contracts in the Netherlands

Integrated contracts are sometimes referred to as 'new forms of collaboration' because contracts are means of facilitating cooperation between the client and the commissionee. In the Netherlands, those new forms of collaboration between public and private parties was amongst others "stimulated by the distrust born out of the practices of illegal price agreements, market sharing agreements and boycott practices in complex infrastructure projects" (Nijhof et al. (2008) in Schouten 2012:22). Van Marrewijk in Schouten (2012:22) explains that "this brought a greater focus on innovative forms of contracting with public and private partners having a more equal role to play".

### 1.1.4 Two reasons for the increasing application of DBFM

There are two reasons why the DBFM and other types of integrated contracts are being increasingly applied in the Netherlands recently.

The DBFM type of contract is relatively new in the Netherlands compared to other European countries where private investment in public infrastructure has been a known phenomenon since the 17<sup>th</sup> century. Around the 1990's the private finance initiative (PFI) was applied in the United Kingdom under the sponsorship of Margaret Thatcher's government. The Dutch DBFM contract is mainly based on the principles of the PFI. (Allard and Trabant 2008:1; Eversdijk and Korsten 2009:3; Altamirano 2010:150) However, whereas PFI in England was mainly a method to pre-finance a project by means of money from the private sector (Provincie Noord-Brabant and Poort van Den Bosch date unknown), in the Netherlands the DBFM model was first introduced by the Dutch government in 1999 by the procurement of several infrastructure



projects because DBFM can generate added value through an accelerated construction process and the use of new techniques (Meens 1997). Currently, the Dutch government also recognises that DBFM is a method for off-balance financing.

## 1.2 The definition of the problem

The Dutch Ministry of Infrastructure & Environment promotes DBFM for infrastructure projects, which for example is observed by Eversdijk and Korsten (2009:2). The conference that Rijkswaterstaat organises annually has the striking name *PPS Werkt!* – i.e. PPP works! However, reports both in the Netherlands and abroad write that the ‘inflexibility’ of DBFM is seen as a limitation of the model.

Because the use of the DBFM contract is rather new in the Netherlands compared to for example the United Kingdom, it is relatively unknown how the initial prognosis of the DBFM contract will function in practice. This also applies to the flexibility of the contract: it is unknown how much flexibility is written in the contract to ‘effect’, i.e. to cover the possibility of changing circumstances that by definition exist, particularly in the longer term, which is the exploitation phase of the DBFM contract.

### 1.2.1 For whom is that a problem?

To Rijkswaterstaat the flexibility of the DBFM contract is an important topic. Though Sewbalak, Kloppenburg et al. (2012:6) advocate that, on the creation of the contract, there is enough flexibility, the Dutch minister of Infrastructure & Environment has recently requested the *Algemene Rekenkamer*<sup>6</sup> to research flexibility in long term contracts (Dronkers 2012).

### 1.2.2 Why is that a problem?

Flexibility of the DBFM contract receives much attention both by academics and practitioners, but in particular by the public sector client because it is worried that public resources are tied up that could also be used elsewhere (House of Commons Treasury Committee 2011b:40). While infrastructures should remain for decades or more, demands and circumstances change rather rapidly. And therefore, the longer a contract runs, the greater the uncertainties are. Macauley (2008:73) wrote that it is not surprising that unexpected events appear in every project, which could for example increase costs. As DBFM contracts in the Netherlands have a term of about 15 to 30 years, flexibility is thus a concern for the client.

The practice in the United Kingdom gives a more elaborate view on why flexibility is (perceived as) a problem. Their PFI is under pressure according to for example De Koning (2011) as amongst others the House of Commons Treasury Committee (2011a:3) has concluded that the aggregated costs of these types of contracts exceed the aggregated costs of ‘traditional’ contracts. In other words: the PFI is too expensive. Further it is observed that both the client and the commissioning party feel bound to each other for the term of the contract (House of Commons Treasury Committee 2011b:40).

### 1.2.3 What do we know about the problem?

The problem of ‘inflexibility’ in DBFM(O) (O stands for operate) has already been explored. From a study into literature it is concluded that the change procedure that is laid down in the DBFM contract is regarded as the best option in the contract that provides for flexibility. The change procedure is a mechanism with which changing and/or changed circumstances can be put into effect in the DBFM contract.

<sup>6</sup> The Dutch National Audit Office.

In his MSc thesis Verboom (2008) concludes that there are several dimensions for flexibility in the DBFMO contract, which is used for housing projects, however, the research is done from the viewpoint of the client, the Rijksgebouwendienst, only.

Hamdan, Van Baekel et al. (2011) approached flexibility from a practical point of view and conclude that the change procedure in the DBFM(O) contracts provides for flexibility, despite the fact that the procedure is found difficult by the commissionee because it finds it hard to foresee the effects of a change. One of the consequences is that the commissionee adds a risk allowance to the pricing and the concern of the client is thus that the price it pays is too high.

### 1.2.4 The problem statement – what do we *not* yet know about the problem?

With respect to the MSc thesis of Verboom (2008) no such research has been done for DBFM contracts for infrastructure and neither has it been done for the viewpoints of the commissionee or the financiers of the DBFM project. The problem investigated in this thesis is as follows:

**For Dutch infrastructure projects it is unknown how the DBFM contract can effect changing circumstances in the exploitation phase of infrastructure projects through the change procedure and how the interests of the contracting parties and the financiers play a role.**

## 1.3 The research objective

Because the DBFM model is rather new in the Netherlands, it is important to gain an understanding of how it functions in practice. This is emphasised by the existence of platforms such as KING<sup>7</sup> and the Centre for Process Innovation in Building & Construction (CPI). Also, because flexibility is a concept, meaning everyone can have his own ‘mental image’ of it, it is complex to understand.

**In these perspectives the research objective of this thesis is to fill in the knowledge gap that exists in flexibility of DBFM contracts, thereby aiming to make recommendations for improving the DBFM approach on Dutch infrastructure projects.**

The above objective points out what results can be expected from the research, namely: insight into and knowledge of the flexibility of the DBFM contract, which is used for drawing recommendations for the DBFM *approach* as a whole.

## 1.4 The research questions

In order to address the research objective a research question is formulated, namely:

*What flexibility is offered by the change procedure in the DBFM contract for Dutch infrastructure projects and how do the interests of the contracting parties and the financiers of DBFM play a role therein?*

To structure the research the following sub questions are drawn:

1. What is meant with flexibility of the DBFM contract?
2. What types of changes are made in practice in the longer term in infrastructure projects in the Netherlands and, according to the contracting parties, do those changes provide for flexibility of the DBFM contract?
3. How do the interests of the DBFM contracting parties and the financiers play a role in the change procedure and therewith in flexibility?

<sup>7</sup> KING: kennis in het groot.

4. What is learned from the experience with flexibility of DBFO contracts for infrastructure projects in the United Kingdom, and how can this experience be used to improve the DBFM approach on Dutch infrastructure projects?

## 1.5 Relevance of the research

For whom is it relevant to study DBFM contract flexibility? Three viewpoints can be discerned, see section 1.5.1 – 1.5.3.

### 1.5.1 Academic relevance

Research into flexibility of the DBFM contract that is provided through the change procedure in the contract contributes to an improved and *rather objective understanding* of the contract model. Although flexibility has been studied before by for example Brinkman (1989) the concept of flexibility in general is difficult to capture nevertheless. This research provides for another dimension of flexibility, namely flexibility of a contract.

### 1.5.2 Practical relevance

Further this research provides an increased understanding of the playing field in which the contracting parties and financiers of DBFM act. As it is observed that practitioners of DBFM contract have a different view on what flexibility of the contract means, and therefore how it can be incorporated and controlled, this thesis can contribute to, for example, the competitive advantage of firms that have this research at their disposal.

### 1.5.3 Societal relevance

Rijkswaterstaat on behalf of the Dutch people funds most infrastructure services in the Netherlands. Therefore the public sector should have an interest in the nation's money being spent effectively and efficiently. Recommendations on the DBFM approach can improve that.

## 1.6 The research design

The design of the research is based on the research sub questions and the research is divided in three phases. See Figure 5 for the research framework.

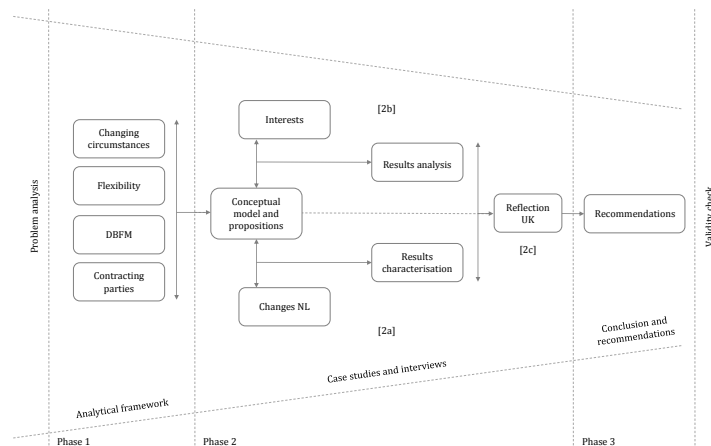


Figure 5 The research framework

### 1.6.1 Phase 1: analytical framework

In phase 1 a literature study is conducted to study the problem statement in depth. Sub question 1 can be answered.

### 1.6.2 Phase 2: case studies and interviews

Then data is gathered about changes, the change procedure and flexibility of DBFM contracts for infrastructure projects in the Netherlands and England. Phase 2 is divided in three parts: a, b and c, in order to answer sub questions 2, 3 and 4.

Phase 2<sup>a</sup> is a case study research with which insight is gained in changes and the change procedure of 4 selected case projects in the Netherlands. In phase 2<sup>b</sup> the focus is on gathering knowledge about the interests of the contracting parties and the financiers of the DBFM project in changes and in flexibility. Then in phase 2<sup>c</sup> the experience with DBFO and PFI and the flexibility of those models in the United Kingdom is researched.

### 1.6.3 Phase 3: conclusions and recommendations

In the third and last phase these results are analysed and interpreted. From the analysis conclusions and recommendations are drawn, with which the research question is answered and the research objective is reached.

## 1.7 Overview of the report

The structure of the report is as follows. Chapter 2 offers the theoretical background of the research. Here sub question 1 is addressed. Then chapter 3 explains how the case studies and interviews are carried out and further describes the 4 Dutch infrastructure case projects. Chapter 4 encompasses the results of the research. In chapter 5 these results are interpreted, from which sub questions 2 and 3 can be answered. This analysis is put into a broader perspective by a brief assessment of the PFI and DBFO practice in the United Kingdom, which is presented in chapter 6 (sub question 4). In chapter 7 the conclusions are drawn and the recommendations for the DBFM approach are presented. The discussion towards the conclusions and recommendations is written in chapter 8, as are the recommendations for further research.



Figure 6 N33 Assen – Zuidbroek DBFM project currently under construction (NL) (Dagblad van het Noorden 2012)

## 2 Analytical framework

In addition to section 1.2.3, this analytical framework presents an overview of what is already known about flexibility of DBFM contracts. The adjoining sub question for this chapter is:

*What is meant with flexibility of the DBFM contract?*

From the literature study it was observed that the DBFM contract can anticipate changes through the **change procedure** (Hamdan, Van Baekel et al. 2011). That procedure is necessary because it specifies “what to do in certain future states or at least which party has the right to act upon the fact that a certain future state materialises (Krüger 2012:1361). Through the DBFM change procedure both physical changes in the asset and changes in the contract mechanisms can be proposed by either the client or the commissionee of the DBFM contract.

Whereas the above description of flexibility is quite unequivocal, the explanation of what flexibility as a *concept* is requires imaginative power. Namely De Haan, Kwakkel et al. (2011:924) suggest that “whatever is flexible can undergo change without changing itself”. From that viewpoint a flexible DBFM contract should be prepared for a change by means of options in the contract. This means that the contract can be employed differently and that flexibility is an ‘engineering task’ as it must be designed purposely.

More specific is the often-cited definition of Upton (1995), who proposes that flexibility is the **“ability to change or react [to changing circumstances] with little penalty in time, effort, cost or performance”**. Therefore in this research the definition is applied to the change procedure of the DBFM contract. That means that it is assumed that the DBFM contract is flexible, if there is little or less than little penalty in respect of time, costs, effort or performance in the changes through the change procedure for the contracting parties (the client and the commissionee).

The conceptual model in appendix A3 shows the relationship between the concepts of this chapter, inclusive of how the contracting parties steer on flexibility.

Because in case studies the analysis of the evidence is one of the most difficult tasks (Yin 1994:102), from the literature study *4<sup>th</sup> propositions* are drawn in this chapter that serve as a blueprint for study. Propositions I and II relate to the change procedure of the DBFM contract, whereas propositions III and IV focus on the interests of the contracting parties and the financiers in the DBFM organisation:

### I. The more changes are made the more flexible the DBFM contract is

Above all it was observed that the change procedure is an ‘option in the DBFM contract, which provides for flexibility in the contract explicitly. Hamdan, Van Baekel et al. (2011) concluded that if changes are put through the procedure the ‘goal of flexibility’ is achieved, which is ‘effecting changing circumstances’. Therefore in this research it is assumed that the number of changes through the change procedure is an indicator of the degree of DBFM contract flexibility.

<sup>8</sup> Two for focusing on the changes in the case projects; two for focusing on the interests. Four in total was appropriate in terms of available time for and depth of this research.

**II. There is flexibility of the DBFM contract if there is little penalty in time, costs, effort or performance**

The penalties in the 4 aspects as defined by Upton (1995) are assessed by means of 'hard' evidence from the case studies by asking for throughput time of changes through the procedure for example. Simultaneously the contracting parties are asked if they feel there is a penalty in those 4 aspects, i.e. how satisfied they are in those respects.

**III. There is less flexibility for the commissionee than for the client due to the 'watchdog' role the financiers fulfill in the DBFM model**

A key characteristic of the DBFM contract is that DBFM projects are privately financed. This means that financiers, such as banks, provide for debt equity so that the commissionee can carry out the realisation. Then in the exploitation phase of the project the commissionee has to amortise that debt equity plus interest. However, due to the involvement of the financiers the DBFM organisation is more complex than the organisation of the conventional contract, and due to the fact that the financiers have an agreement with the SPC it is expected that the commissionee has a limited degree of flexibility to put changing circumstances into effect.

**IV. The DBFM contract is not flexible if change proposals are rejected**

Moreover, a priori this research assumes that whether changes are withdrawn or rejected by one of the contracting parties is an indicator of the degree of flexibility. This is because it is expected that such changes imply that (types of) changes cannot be accommodated by the change procedure, and thus cannot be effected by the DBFM contract. It is expected that such (types of) changes are of large value for example.

Sections 2.1 and 2.2 provide background information on these conclusions and propositions.

**2.1 The DBFM contract**

With a 'DBFM' contract a commissionee has to design, build, finance and maintain an (infrastructure) asset. In order to reduce transaction costs per project, Rijkswaterstaat and the Dutch ministry of Finance have been developing a standard DBFM contract. At current version 3.0 for infrastructure (28 March 2012) is being employed. The contract is publicly available.

**2.1.1 Principles of the DBFM model**

By means of the DBFM contract the public sector aims to create added value, i.e. value for money. It distinguishes the DBFM contract from the conventional building contract, see section 1.1.2.

**Value for money** means achieving higher quality infrastructures with the same budget, or the same quality with a smaller budget. This increases the efficiency with which the infrastructure is realised and so a better ratio between quality and price is created (Commissie Private Financiering van Infrastructuur 2008a:23-27). The Ministerie van Financiën (2012) calculated that the minimum project value with which this efficiency can be obtained is €60 million for infrastructures; benefits then outweigh (transaction) costs.

In order to achieve value for money, the following principles are key to the DBFM model:

**- Distinctive division of risks and responsibilities between client and commissionee**

Key to achieving value for money is an efficient transfer, allocation and management of risks. That means that risks are assigned to the commissioning party who is most competent of managing those risks. The DBFM contract is designed to transfer long term risks to the commissionee of the contract in order to build and maintain the

infrastructure asset in the most economic and efficient manner. (Eversdijk and Korsten 2009:3; HM Treasury 2011:4; Ministerie van Financiën 2012)

Who is responsible and what are the responsibilities? The commissionee is responsible for the design and (re)construction of a project, where after it has to maintain the asset. As yet, the client of the DBFM project is the public sector, who is responsible for the transportation network. Often this is Rijkswaterstaat, because it is the road operator who has the final responsibility for the well-functioning of the infrastructure service. (PPP Unit date unknown:14)

**- Private financing**

Another key principle of the DBFM is that the project is financed with **money from the private sector**. Whereas in 'traditional' models the client both funds and finances the project, in the DBFM model this is the commissionee's responsibility. The private parties raise the money – the finance – whereas the costs of the project are borne by the public sector – the funding. See Figure 7. (Ministerie van Financiën 2012:4)

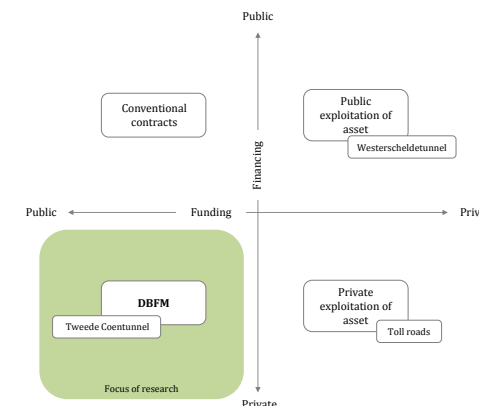


Figure 7 Financing and funding of construction projects (free from Huijsman 2010)

The commissionee of the DBFM contract is a legal person; a so-called special purpose company (SPC) that has to organise the funding that consists of private and debt equity. The balance between those two types of equity is usually about 10% to 20% as against 80% to 90%.

Shareholders provide for the SPC's private equity. Often those shareholders are industrial investors, which carry out the project's construction activities at the same time. Besides, the SPC can have institutional investors such as pension funds.

For the debt equity commercial loans are arranged with financiers, i.e. banks and other types of investors such as insurers. Because the debt capital can amount to large budgets, for example €1 billion, one or several financiers function as lead arranger<sup>9</sup>. They make sure that together the lenders provide for the debt equity. (Commissie Private Financiering van Infrastructuur 2008b:24; Ministerie van Financiën 2012:8)

<sup>9</sup> In the DBFM HSL-Zuid project the lead arranger is called the 'global agent'.



## - Life cycle approach

The duration of the DBFM contract should “reflect the optimal period over which the procuring authority [the client] wishes its services to be provided” (National Audit Office 2008:7). According to Greve (2007 in Eversdijk and Korsten 2009) the contract's term is dependent on the availability of the service, the rate of return and the redemption of the debt equity.

Often the contract's term is referred to as the life cycle of the asset. Because the aspects of design, construction and maintenance of the DBFM project are incorporated into one single contract, the term of the DBFM contract is about 15 to 30 years in the Netherlands. The realisation stage takes 1 – 5 years, dependent on the type of project.

For the commissionee the integration of the construction aspects should harness an incentive for taking into account maintenance of the asset in the design phase already. In this way it can steer on the life cycle costs of the asset in an early stage of the project. In turn, this holistic approach should deliver efficiency for the public sector.

Payment of the commissionee is based on the life cycle costs of the asset, see section 2.1.2. (Commissie Private Financiering van Infrastructuur 2008a:33; Eversdijk and Korsten 2009:3; HM Treasury 2011)

## - Payment for a service instead of a product

For the risk transfer in the DBFM contract a specific payment mechanism is established that is subject to availability and performance of the infrastructure service. With a DBFM contract the client buys a service rather than a product, because it pays on basis of the availability of the asset. (Ministerie van Financiën 2012:4)

## - Functional requirements

Lastly, the DBFM contract is characterised by functional, i.e. output-based requirements, which the client has specified before the tender stage already. By means of those requirements the commissionee can decide on how to realise the service of the asset, as it is not bound to a detailed set of technical requirements.

Output specifications are believed to promote creativity of the commissionee, so that it will design for innovative and/or sustainable solutions.

These principles promote value for money. What is more, DBFM is an **opportunity for off-balance financing** (Commissie Private Financiering van Infrastructuur 2008a:23). This is because the client of the DBFM contract has to pay the commissionee only when the project is realised.

### 2.1.2 The DBFM payment mechanism

In the DBFM model the income of the commissionee is generated by the availability of the asset. The height of the net availability payment differs per phase in the project, see Figure 8.

The standard DBFM model explains that this net availability payment (*NAP*) is a percentage (%) of the gross availability payment (*GAP*) that the commissionee receives every period – a quarter of a year – minus the availability adjustment (*AA*) and the performance correction (*PC*):

$$NAP = \% \times GAP - AA - PC$$

In essence the availability of the asset commences on the date the commissionee is responsible for the asset. But as in the construction phase the asset is only partially available, for *p* about 20% is computed. However, in the maintenance period this is 100%, because the

asset should then be ready. This mechanism implies an incentive for the commissionee. Namely, the earlier the asset is available for use, the earlier an income stream is generated and the earlier the commissionee can pay off the debt plus interest to the financiers. At this point the providers of the loan capital want to be sure that the commissionee receives 100% of the fee, as it is the only income generated from the project. There is a risk in this for the commissionee.

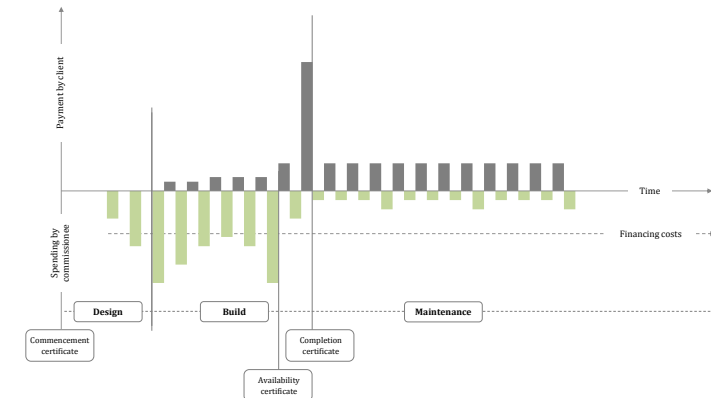


Figure 8 DBFM financing scheme (free from PPP Unit date unknown)

Further if the asset is partially available the commissionee receives less money. The deduction, measured in number of lane closures, is dealt with in the availability adjustment (*AA*) and also the performance correction (*PC*) by means of penalty points. The commissionee receives a lump sum 'one-off' payment when the completion certificate is issued. See appendix A2.2.

### 2.1.3 Roles and organisation of the DBFM contracting parties

For shaping the context of the functioning of the DBFM contract, which is important for understanding flexibility of the DBFM, it is important to know the interests and role(s) of the DBFM contracting parties. These are briefly discussed here.

In general in the DBFM model several players can be identified. See Figure 9: the agreement between the client and the special purpose company (SPC) is the DBFM contract. The SPC is the commissioning party of the project.

Both contracting parties have their separate direct agreement with the financiers of the project. Therefore the agreement between the commissioning parties and the financiers is a **tripartite agreement**.

## - Role and perspective of the client

Usually a public sector organisation, such as Rijkswaterstaat or ProRail, acts as the client in the DBFM contract, in which it can focus on its core business: managing the road network (Eversdijk and Korsten 2009:14).

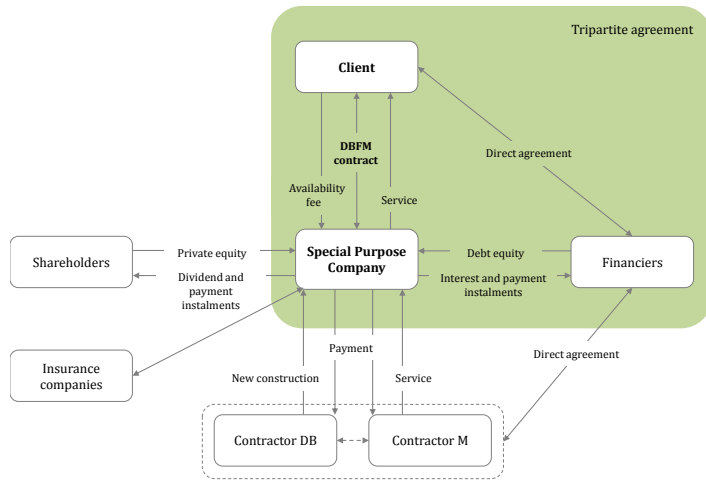


Figure 9 Organisation scheme DBFM (free from Commissie Private Financiering van Infrastructuur 2008b:23)

According to Boot, Bruggeman et al. (2008:30) infrastructural clients usually “have little interest in the aesthetical side of the design” but are rather interested in timely completion and usability of the work after completion. In general the public sector desires a societal return on investment, which is understood as the extent to which societal needs are satisfied, and these can differ per project (Bult-Spiering 2003:30,31,160-195). For example: to improve traffic safety and to increase the quality of a whole area, which was the case for the A59 road project (2003:170), or to decrease the construction period by using the DBFM model, which was the case for the HSL-Zuid rail project (2003:175).

#### - Role and perspective of the commissionee (SPC and contractors)

The commissionee, i.e. the special purpose company (SPC), is the contracting party that is responsible for the design, finance, building and maintenance of the infrastructural asset. And because DBFM projects are usually more complex than conventional projects the SPC is a consortium of several organisations such as contractors and project management firms. Those organisations are the shareholders of the SPC, sometimes also referred to as the special purpose vehicle (SPV).

#### The special purpose company

Being the contracting party, the SPC is responsible for the contracts with the contractors, the financiers such as the banks, the shareholders and the SPC's insurance companies. As the official commissionee the SPC “manages the asset during the contractual period and bears the risk of failing to meet service obligations” (National Audit Office 2008:8), which means that every change has to be processed through the SPC.

#### The contractors

However, by means of **back-to-back contracts** many of the risks of the SPC are ‘passed on’ to one or more contractors. Usually in a DBFM project there are two ‘types’ of contractors that actually carry out the construction works: there are one or more contractors that realise the project (EPC: engineering, procurement and construction)

and one or more contractors that are responsible for the maintenance phase (MTC: maintenance).

Like for the client for the individual members of the consortium interests can differ per project. In the A59 road project the interests of the private parties are to have turnover and return on investment, but also to improve and maintain its image as this is perceived to be useful for future projects. Further for example in the HSL-Zuid rail project the private parties aimed at gaining experience with the DBFM contract. (Bult-Spiering 2003:160-176)

#### - Role and perspective of financiers

Financiers play an important role in the DBFM project organisation as they provide the SPC with debt equity. Another function of the financiers in the DBFM model is “to ensure that a proper financial structure is in place, which will guarantee that the project's financial requirements are properly met” (Akintoye, Beck et al. 2003:128,129). This means that the financiers act as a project's debt arranger and as a financial advisor.

Besides, the financiers establish a direct agreement with the DBFM's client too and therefore function as **‘watchdogs’**. If in any case the commissionee cannot finish the project, the financiers have a step-in right by means of that direct agreement as for them the only way to ensure income is to continue the project. (Koster, Hoge et al. 2008:10,42-45)

However the financiers (often) do not have the knowledge to assess the risks of a DBFM project. Therefore they hire financial, legal and technical advisors. This **due diligence** process is a “detailed early-stage planning and preparation [that] should assist an authority to identify any project-specific features, obstacles and risks” (Akintoye, Beck et al. 2003:172).

## 2.2 Flexibility of the DBFM contract

In this research is observed that ‘flexibility’ is an ambiguous word. This means that it is a concept, i.e. an umbrella term. Therefore first this concept is studied upon (sections 2.2.1 and 2.2.2), and then in section 2.2.3 the definition of flexibility is presented. The thesis uses this definition to assess what flexibility of the DBFM contract is offered by the change procedure. The procedure is focused upon in the last sections of this chapter.

### 2.2.1 Why is flexibility useful?

Usually financiers and contracting parties of large construction projects such DBFM are (professional) organisations, wherein the management of information is an important business process; decisions are taken on basis of information. Consequently, a problem arises when there is not enough information to take such decisions. It means that there is a difference between the information required and the information available. In other words, there is not enough information and hence there is uncertainty.

According to Winch (2006:5-7) **uncertainty can be caused by complexity or unpredictability**. It is caused by complexity when it is too costly to collect and analyse information while it is available. When uncertainty is caused by unpredictability, it means that though experience for decision-makers is usually a reliable guide to the future, by definition they do not know that future: “the only certainty is change”.

**Flexibility** is a way to deal with the uncertainties that the future holds and can be beneficial for systems “to be adaptive to survive under changing circumstances” (De Haan, Kwakkel et al. 2011:924). The environment of (construction) projects is inevitably dynamic as these have to

deal with such changed and/or changing circumstances. Unpredictability makes up a great part in estimations of the future, such as planning schemes (Cruz and Marques 2012). This specifically concerns long lasting projects and their adjoining contracts, such as DBFM contracts. Also see appendix A2.7.

### 2.2.2 What is flexibility?

As a concept 'flexibility' is thus frequently used as a way or an adaptation mechanism to deal with uncertainty. More specific, flexibility is the ability "to keep on meeting a societal need under changed, or changing circumstances" (De Haan 2011:922), the 'demand' being that society finds infrastructures necessary for consumption (transportation) and (economic) productivity.

Flexibility is also an 'idea': in general it means 'to bend' or 'to change shape' and so flexible things do not break. This implies that an external force is applied and therefore De Haan, Kwakkel et al. (2011:924) suggest that **"whatever is flexible can undergo change without changing itself"**. Those authors have compared the concept of flexibility with the concepts of adaptivity, robustness and resilience. From their research it can be concluded that:

- Flexibility is characterised by an anticipatory quality. This means that something, for instance a DBFM contract, that is flexible is thus **prepared for a change**.
- Consequently the system, i.e. the contract, **can be employed differently**. Flexibility thus means that the structure of the system remains intact.
- Flexibility also refers to changes on the longer term as those appear **gradually**.
- And compared to the other concepts as mentioned above, with flexibility the situation is **permanently altered**.

The above characteristics are elaborated upon in detail in appendix A2.10.

### 2.2.3 The definition of flexibility in this research

Despite the literature study in the previous sections, 'flexibility' remains a concept. Therefore the following 'manifestation' is introduced, as it provides for an important 'operational' direction of flexibility of the DBFM contract by the change procedure.

The definition of flexibility is established by Upton (1995:207) who states that flexibility is the **"ability to change or react [to changing circumstances] with little penalty in time, effort, cost or performance"**. This definition is often cited, for example by Spirco, Fomin et al. (2007:73), probably because the definition tries to quantify 'flexibility' in order to reduce its abstract and ambiguous connotations.

### 2.2.4 Dimensions of flexibility of DBFM models

Besides, it is observed that 'flexibility' has to be discerned along various dimensions, which are important for understanding the concept. Namely, when the vagueness of the concept is removed, it "can be understood, measured and managed better" which is important for filling in the knowledge gap that exists for flexibility of DBFM contracts. (Upton 1995:73)

The dimensions are 'what' it is "that flexibility is required over" (1995:77). In his MSc thesis Verboom (2008) discerns between flexibility that is required in the process and in the product, the latter being divided in flexibility in the contracted asset (for example the railway) and the services (particularly important when the commissionee is responsible for operation too). Further flexibility can be internal and external, and it can be required and/or regarded from a particular perspective.

- **Flexibility of the 'product'**  
Firstly, flexibility of the product, which is the quality of the contract's underlying asset(s) and service(s) to adapt to a changing demand, for instance by the (end) users of the

asset. It can be regarded as the 'physical flexibility' in the infrastructure asset, such as constructing for space in the layout of a road in order to create the flexibility to construct an extra lane in the future, or preparing for additional floors by over dimensioning the foundations in case of a building. Physical flexibility is recognised by other authors too, such as Bouten (2008); De Haan, Kwakkel et al. (2011); and Leunissen (2011) ('intrinsic flexibility').

The degree of product flexibility however differs per business sector. According to Cruz and Marques (2012) it applies not very well to a dam, because "it is difficult to incorporate significant flexible options for future development, since the construction plan follows an 'all or nothing' philosophy". It implies that in some types of assets it is relatively easier to provide for flexibility options.

#### - Flexibility of the 'process'

Secondly, flexibility in the construction process can be defined by "the possibilities that are available in the process to make changes" (Verboom 2008). Process flexibility as a whole applies to every phase of the project; see Figure 10. The DBFM process runs from initiative to exploitation and due date. Those phases are interconnected and each of them can be characterised by process flexibility.

Sewbalak, Kloppenburg et al. (2012) state that with flexibility of the DBFM contract is meant how to 'deal' with circumstances that are changed after the contract is awarded ('selection'). It is therefore assumed that flexibility of the contract (phase) runs from financial close to the contract's due date, see the marked green field in Figure 10.

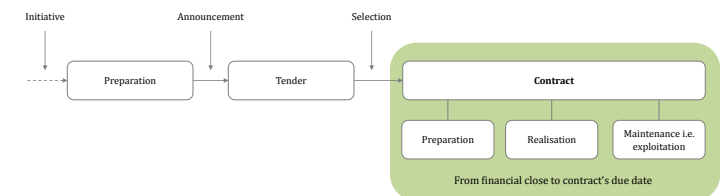


Figure 10 The process of a DBFM project

#### - Internal and external flexibility of the contract

Further, Van Dijk (2009) divides contract flexibility in internal and external flexibility, respectively that is the flexibility in the contract, or replacing or amending it. The latter has not been included in the scope of this research.

#### - Flexibility from a particular perspective

Flexibility of a contract can be understood from a particular perspective, i.e. that of the client, the commissionee or the financiers. Tan and Yang (2012) explain that this touches upon the particular division of risks that underlies those parties' relationship. Therefore this is essential in understanding flexibility of the DBFM contract. Appendix A2.11 goes into greater detail of this dimension.

See the conceptual model in appendix A3 for these dimensions.

### 2.2.5 Flexibility of the DBFM contract through the change procedure

According to Hamdan, Van Baekel et al. (2011) DBFM(O) contracts anticipate changes and hence provide for flexibility through the change procedure. It is concluded that **when changes are 'put' through the change procedure "the goal of flexibility is met"** (2011:15). A process

such as the change procedure in the (DBFM) contract is necessary because it specifies “what to do in certain future states or at least [specifies] which party has the right to act upon the fact that a certain future state materialises” (Krüger 2012:1361). Therefore the change procedure is the focus of this research.

### The change procedure in Rijkswaterstaat’s standard DBFM model (3.0)

In Rijkswaterstaat’s standard DBFM model, dated 28 March 2012, §13 and schedule 5 specify how and under which conditions changes can be made to the contract. Figure 11 and appendix 2.15 are derived from that.

By means of the change procedure changing circumstances can be effected in the DBFM contract; both physical changes in the asset and in the contract mechanisms can be made. These changes can be initiated either by the client or the commissionee, at a certain point in the contract phase.

See Figure 11, which shows that the DBFM change procedure divides for ‘small’ and ‘other’ changes. Because the procedure for small changes consists of fewer steps, it should be shorter in throughput time.

Whether a change is ‘small’ or ‘other’ is discerned by a threshold value that takes into account the ‘financial loss’, which is a full compensation for the extra costs and risks the contractor(s) incur(s) with the change. For example, the threshold value in the DBFMO contract of the RegioTram Groningen amounts to €25,000. The financial loss is agreed upon in order to avoid that – in disadvantage of the client – the commissionee adds a risk premium to the price of the change (Hamdan, Van Baekel et al. 2011:49).

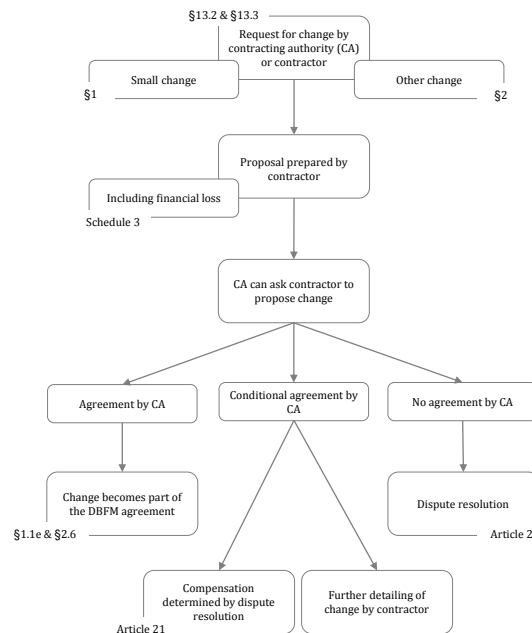


Figure 11 Scheme of the change procedure from the standard DBFM contract

### 2.2.6 Classification of changes

This research classifies changes because categories of changes “should help authorities [i.e. clients] in drafting mechanisms that are best suited for the pattern and types of changes occurring in their sector” (HM Treasury 2012a:79). The HM Treasury proposes to divide for changes by origin, timing, value, impact and type. See Table 3.

Change by	Divided in			
Origin	Contracting authority	Contractor	Change in law	
Timing	Construction	Early operations	Steady state operations	
Value	Small	Medium	Large	
Impact	Financial	Works	Services	Works and services
Type	Use or functionality	Capacity or throughput	Service specifications and performance standards	

Table 3 Classification of (service) changes derived from HM Treasury (2012a)

However, the classification in **Table 3** is **not directly applicable** to this research, because:

- With respect to *value*, the case projects only define for changes above or below a(n) (un)defined threshold, as seen in section 2.2.6.
- With respect to *capacity* (in type), the mechanism of toll payments is not applied in Dutch infrastructure case projects, instead the commissionee gets paid on basis of availability.

Besides, it is observed that in literature ‘origin’ has a different meaning than the HM Treasury implies. In general the origin of changes are “conditions or events that either directly trigger or contribute to a change in construction projects” (Sun and Meng 2009:563). The taxonomy that those authors present comprises of changes that originate from internal, external and/or organisational causes. This research ‘uses’ the division between internal and external, as the focus of the research is not on the trans-project relationships. See appendix A2.11.

- **Internal**  
Internal causes are project-specific (Sun and Meng 2009:568).
- **External**  
External changing circumstances are “beyond the control of the project team” (Sun and Meng 2009:568). De Ridder (2011:1) argues that dynamics exist because of changing circumstances in “demography, mobility, technology, economy, ecology, climate, sea level, urbanisation, availability of resources”. These are examples of external origins.

As a result, this research relies on the **classification of changes in Table 4**.

Change by	Divided in	
Initiator	Client change	Commissionee change
Origin	Internal	External (change in law)
Value	Below threshold	Above threshold
Impact	Financial only	Works and services
Type	Use or functionality	Service specifications and performance standards

Table 4 Classification of (service) changes as used in this research





Figure 12 €1,2 bio DBFM project A15 motorway  
Maasvlakte - Vaanplein in the harbour of Rotterdam  
(NL) (A-lanes A12 2013)

### 3 Methodology and case projects

The previous chapter dealt with the first sub question of this research. In this chapter is explained how case study research is employed to answer the remaining three sub questions and how the thesis arrives at recommendations for the DBFM approach, i.e. the objective of the research.

#### 3.1 Methodology: case study research

The empirical data for this research is gathered by means of qualitative procedures, namely case studies and interviews. This is because the research focuses on an understanding, particularly from the contracting parties and the financiers' point of view, of flexibility of the DBFM contract in its 'natural' setting. (Ghuri and Grønhaug 2005:110)

##### 3.1.1 Phases in the research

The research consists of several phases, namely:

- **Phase 1: literature study**

The first step in the research is to study literature on flexibility of DBFM contracts, which was done in chapter 2. See appendix 4.2.1 for additional information thereof.

- **Phase 2: case studies and interviews**

The next phase consists of three parts, namely a, b and c.

At first 4 cases are selected to carry out the actual case study research, see section 3.1.2. This is phase 2<sup>a</sup>. In order to discuss changes in the case projects, 8 semi-structured interviews are held with representatives of the client and the commissionee of those projects (4x2).

In phase 2<sup>b</sup> insight is gained in the interests of the contracting parties and the financiers. Thereto 8 'open' interviews are held with employees from Rijkswaterstaat, Dutch contractors and legal and financial advisors. These interviewees are 'independent' from the case projects, as they do not have a (direct) relationship with the case projects.

For answering sub question 4, in phase 2<sup>c</sup> a 4-day visit is made to London, where interviews are held with representatives of the Highways Agency, EC Harris and BAM PPP UK. Further, reports about the private finance initiative, amongst others published by the UK government, are studied.

The interviews in phase 2 are 'transcribed'.

- **Phase 3: analysis, conclusions and recommendations**

Then in phase 3 the data is interpreted by means of the propositions from the analytical framework. This means that the results are 'made sense of' (Ghuri and Grønhaug 2005). The interview transcripts are analysed by means of tables in which the information from the interviews is categorised. On basis thereof conclusions are drawn and recommendations are made in order to reach the research objective.

##### 3.1.2 Selection of case projects

Because there is only little experience with flexibility of the DBFM contract, this study aims to obtain rather general and descriptive assertions on the subject, and therefore investigates multiple cases. These can produce similar or contrasting results, which is because those projects are characterised by differences and similarities. (Yin 1994:46)

In order to do cross-case analyses, the case projects of this study comply with the **following conditions (similarities)**:

- The projects are procured with the same type of contract, i.e. DBFM.
- The works concern transportation infrastructure.
- The completion certificate has been issued in these projects, i.e. projects are in the 'exploitation' phase.
- And that the projects are located in the Netherlands.

See appendix A4.1. Following the conditions, the case projects suitable for this research are:

- **A59** motorway between Rosmalen and Geffen
- **N31** highway between Nijega and Leeuwarden
- **HSL-Zuid** rail from Amsterdam to the Belgian border
- **A12** motorway between Utrecht Lunetten and Veenendaal

However, the observant reader notes that only the availability certificate, i.e. not the completion certificate, of the A12 project was issued when this research project commenced, which was in October 2012. The reason why the project is included in this research anyway is to enlarge the scope and the number of case studies.

	<b>A59</b>	<b>N31</b>	<b>HSL-Zuid</b>	<b>A12</b>
Client	Province of Noord-Brabant	Rijkswaterstaat	ProRail	Rijkswaterstaat
Commissionee	Poort van Den Bosch	Waldwei.com	Infraspeed	Poort van Bunnik
Commencement	May 2003	March 2004	2002	January 2011
Available	October 2005	December 2007	July 2006	Augustus 2012
Completion	January 2006	December 2007	December 2006	March 2013
Maintenance	15 years	15 years	25 years	20 years
Contract end date	2020	2023	2031	2032
Contract value	€218 million	€80 million	€1,2 billion	€260 million

Table 5 Factsheet case projects

Table 5 outlines the **differences between the case projects**. The projects are characterised by a different context, for instance they are built at a different location in the country and they were procured under different economic circumstances. Or they differ in the experience the (representatives of the) contracting parties have with DBFM. That can influence the respondent's answers.

### 3.1.3 Skills for doing case study research

In case study research a particular set of skills is important compared to for example lab experiments. These include question-asking, listening, being adaptive for and in the interviews, and understanding that bias is involved. (Yin 1994)

In order to practice these skills, 'test interviews' were held with two colleagues of Arcadis Infraconsult (Mr Ridwaan Tmalla and Mr Wijnand Susanna) in February 2013. It is understood that despite such preparation the quality of the data and the interpretation thereof 'depends' on the researcher anyway.

### 3.1.4 Protocol for interviews

To a (very) large extent the case study research relies on interviews. In order to get the most out of the interviews, interview protocols were established. The protocol aims to prepare the

respondent to the interviewee, as it was sent at least two days before the interview. See the appendix (A4.3 and A4.4).

Contract managers of the case projects were asked to cooperate in the research. In some of the case projects changes are monitored by risk managers for example.

### 3.1.5 The use of propositions as a blueprint for study throughout the research

A useful strategy in doing case study research is using propositions, in order to analyse the case study evidence (Yin 1994:102).

Therefore from the literature study 4 propositions were established, see chapter 2. These serve as a blueprint for study in the remainder of the research, i.e. for assessing what flexibility of the DBFM contract is provided by the change procedure, particularly in the exploitation phase of DBFM (infrastructure) contracts. In the appendix (A4.2.2) is explained in detail how the propositions must be understood.





Figure 13 At the foreground the A59 DBFM route between Rosmalen and Geffen (derived from Provincie Noord-Brabant and Poort van Den Bosch date unknown) and at the background a section of the A59 DBFM route (derived from Robert de Munnik)



### 3.2 Case project A59 motorway Rosmalen – Geffen

The A59 is the first DBFM road project in the Netherlands. The project encompasses the reconstruction of the two-lane (1x1) N50 highway to the four-lane (2x2) A59 motorway between the places of Rosmalen and Geffen in the province of Noord-Brabant, see Figure 13. The project consists of the construction of 9,1 kilometres of motorway, four junctions and a noise barrier of about 10 kilometres. The commission also includes the construction of a fly-over, two tunnels and seven traverses for animals. Realisation of these works has taken 2 to 3 years and the commissionee is responsible for the maintenance of the road for 15 years. (Van der Meer 2011:72)

In 1985 the project was initiated already because the highway was unsafe and traffic jams were daily business, which made car drivers to use adjacent roads. For the Province and the surrounding municipalities this was an undesirable situation. Therefore in 1998 local authorities repeatedly emphasised that reconstruction of the N50 was necessary. The then Ministry of *Verkeer & Waterstaat*, the current Infrastructure & Environment, agreed on the project but noted that budget would be available only from 2007 onwards. Then the Province of Noord-Brabant proposed to apply the DBFM model. (Susanna 2011; Provincie Noord-Brabant and Poort van Den Bosch date unknown).

#### 3.2.1 Project organisation

Consortium Poort van Den Bosch is responsible for the realisation and the maintenance of the project. The Poort van Den Bosch consists of the Koninklijke BAM, Boskalis and Fluor Infrastructure. The SPC is advised by amongst others PRC as the technical advisor, Van Doorne as its legal advisor and the RebelGroup as its financial advisor (Susanna 2011). The maintenance contractor is *BAM Wegen* that has signed a contract with the Poort van Den Bosch (Van der Meer 2011:74).

**The Province of Noord-Brabant acts as the client of the project.** It is the first project in which a decentralised organisation has monitored the procurement process (Susanna 2011; Provincie Noord-Brabant and Poort van Den Bosch date unknown). However, whereas the Province acts as the client, Rijkswaterstaat is responsible for the road network and thus for the budget.

#### 3.2.2 Budget

The total budget of the project is €218 million. The Ministry funded the project with €195 million, which included €9,5 million of 'PPP budget'. That is meant to create knowledge of and learn lessons on PPP for the Netherlands. The municipalities contributed €11,5 million and the Province did so too.

#### 3.2.3 The DBFM contract and the change procedure

Due to the fact that this is the first DBFM contract for Rijkswaterstaat, the change procedure in the standard DBFM model 3.0 is based on the change procedure of the A59 project.

The change procedure of this project does not distinct for small change values or other changes, like the standard DBFM contract 3.0 does. The basic principle of the procedure is that the party that requests a change pays the adjoining costs.

Risks for changes in legislation of the local government are allocated to the Province of Noord-Brabant. Risk for change in legislation is further allocated to the Poort van Den Bosch, except for special legislation allocated to the national government. Further the Province of Noord-Brabant is responsible for changes by request of the national government (Rijkswaterstaat).



# N31

### 3.3 Case project N31 highway Nijega – Leeuwarden

The DBFM project Wâldwei, which means 'forest road', is the N31 route between Hemriksein in Leeuwarden and Nijegaasterhoek near Drachten. The assignment encompasses the reconstruction of a two-lane (1x1) highway to a four-lane (2x2) highway in the province of Friesland. Further it entails the construction of the aqueduct *Langdeel* and the replacement of the *Fonejachtbrug* (a bridge) by two bridges. The commission includes the maintenance of 23 kilometres of the N31 between Leeuwarden and Drachten. (Van der Meer 2011:67; BAM PPP 2012b)

This project has been started to improve traffic flow and road safety, which was necessary since many serious accidents took place. This was already acknowledged by Rijkswaterstaat Noord-Nederland in 1992. In 1999 the project was nominated by the national government for being procured as a PPP project. As this is one of the first DBFM contracts in the Netherlands the primary goal of applying the DBFM model is to gain experience in the type of contract (Buck Consultants International & John Cooper Consulting 2004:24,29; BAM PPP 2012b).

#### 3.3.1 Project organisation

The consortium Wâldwei.com consists of the shareholders Koninklijke BAM Groep, Ballast Nedam Infra and Dura Vermeer Groep. Bouwcombinatie Wâldwei is both responsible for the realisation (EPC) and the maintenance (MTC) of the project. At the outset of the project the financiers of the consortium are the *Bank Nederlandse Gemeenten* (BNG) and the NIB Capital (NIBC Bank) (Buck Consultants International & John Cooper Consulting 2004:26).

Rijkswaterstaat Noord-Nederland is the client of this project. Wâldwei.com has to report to Rijkswaterstaat about everything that relates to the DBFM contract, inclusive of the financial aspects. (Van der Meer 2011:69; BAM PPP 2012b)

#### 3.3.2 Budget

The N31 DBFM project is characterised by a total budget of €80 million (net present value for 2002: €151 million). Thereof €60 million is available from the *Meerjarenplan Infrastructuur Transport* (MIT), which is intended for construction. The remaining €20 million is destined for maintenance. The then *Kenniscentrum voor PPS* contributed to this budget. The one-off payment at time of availability was €40 million. (Buck Consultants International & John Cooper Consulting 2004:60,76)

#### 3.3.3 The contract and the change procedure

One of the main principles in this DBFM contract is that the parties strive to make as few changes as possible. In the case of unforeseen circumstances the procedure does rarely deviate from what the Dutch civil code prescribes in such situations (BW 6:258.1).<sup>10</sup>

The risk for change in legislation is allocated to the Wâldwei.com. The risk for change in special legislation, which is applicable to construction and maintenance that can have consequences for the availability of the N31 road, is allocated to Rijkswaterstaat. (Buck Consultants International & John Cooper Consulting 2004:10,58)



Figure 14 At the foreground the N31 DBFM route (Buck Consultants International & John Cooper Consulting 2004:23) and in the background the N31 DBFM project in the Province of Friesland (Regieraad voor de Bouw)

<sup>10</sup> Ad Kooijman, e-mail 22 January 2013.



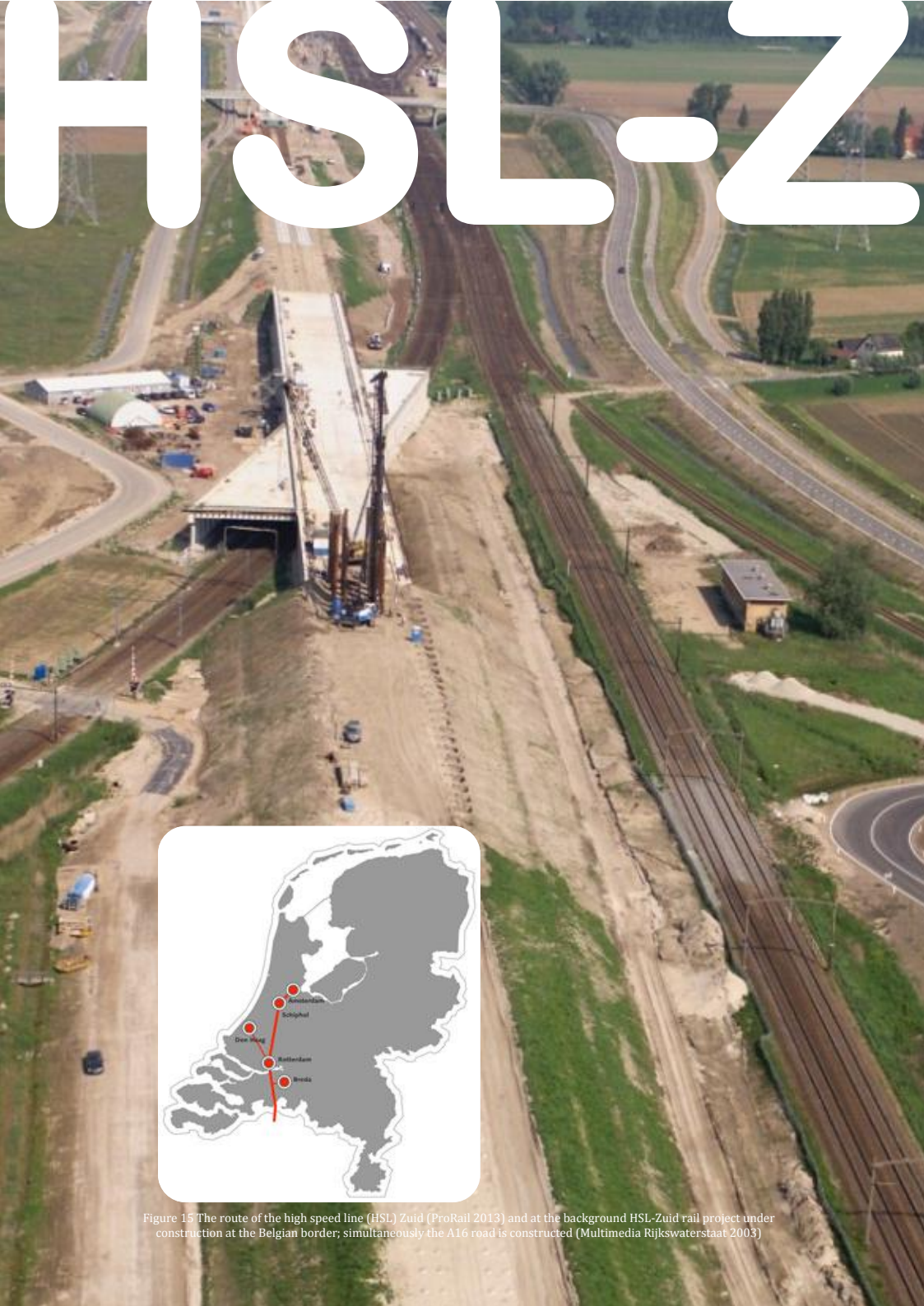


Figure 15 The route of the high speed line (HSL) Zuid (ProRail 2013) and at the background HSL-Zuid rail project under construction at the Belgian border; simultaneously the A16 road is constructed (Multimedia Rijkswaterstaat 2003)

### 3.4 Case project HSL-Zuid rail

The HSL-Zuid project is about the construction of the High Speed Line between Amsterdam and Breda in the Netherlands, which connects Amsterdam to Paris via Breda, Antwerp and Brussels. See Figure 15. Though the NS has withdrawn from the Fyra in June 2013, *High Speed Alliance*, which is a partnership between the Dutch railways NS and KLM, (still) has the concession to operate the rail between July 2009 and July 2024.

The DBFM contract encompasses the responsibility for the construction of the superstructure of the HSL-Zuid, which includes the rail, the overhead wires and the transformer stations, the communication and signalling systems, the noise barriers and the construction works in tunnels. Before the commissionee could carry out this assignment, the substructure was realised. Since 2006 the commissionee is responsible for the **maintenance of the super and sub structures** for about 25 years. Besides, it is obliged to guarantee 99% availability of the track. (ProRail date unknown)

#### 3.4.1 Project organisation

Infraspeed is the consortium that consists of several companies that have their own expertise. Fluor Infrastructure is responsible for the project management; Siemens Nederland is responsible for the systems for electricity, safety and communication, and for supportive systems such as lights and control; and the Koninklijke BAM Groep is responsible for the Rheda rail system, tunnel buildings and noise barriers.

Providers of the private equity are, besides the consortium's shareholders as mentioned above, Innisfree Ltd and HSBC Infrastructure Ltd.

The consortium carries out the commission of the HSL-Zuid contract for the state of the Netherlands. Though the Ministry is responsible for the rail network, the contracting and developing party is ProRail, which has been involved at a later time in the project (Schlichting 2008:4). ProRail manages the network and therefore is responsible for communication with stakeholders, distribution of the capacity over the network and the director at the network (ProRail date unknown).

#### 3.4.2 Budget

The total budget of the HSL-Zuid DBFM project is about €1,3 billion. The HSL-Zuid project has been financed with amongst others money from the European Investment Bank (€400 million). The equity provided by the financiers amounts to circa €600 million.

#### 3.4.3 The contract and the change procedure

In the HSL-Zuid project there are 4 separate contracts. One of these is the DBFM contract which has been awarded to Infraspeed and signed in December 2001.

In rough lines the variation process, i.e. the change procedure does not deviate from the change procedures in the road projects. There is a threshold value of (indexed) about €30,000. The SPC has a budget from which the small variations below the threshold have to be paid. The changes in the HSL-Zuid DBFM contract are called 'variation proposals'. When the State (ProRail) initiates these they are called state variation proposals (SVPs), when Infraspeed does so, they are called infra provider variation proposals (IPVPs). See appendix A5.2.

At any moment in the procedure ProRail is allowed to withdraw its proposal. However if Infraspeed has then prepared the so-called variation impact report including detailed costing already, the costs that are yet made are to be borne by the state.



# A12

## 3.5 Case project A12 motorway

This project encompasses the widening of the A12 between Utrecht Lunetten and Veenendaal over a section of 30 kilometres. The assignment is twofold: the hard shoulder is prepared so that it forms a new lane<sup>11</sup> and the commissionee has to construct extra lanes. The project is divided in three sections; Lunetten – Bunnik; Bunnik – Driebergen; and Driebergen – Veenendaal. See Figure 16.

Amongst others the commission entails the renewal and construction of viaducts, two large eco-ducts, culverts, noise barriers and 'dynamic transportation management' supplies. The project is part of the umbrella project *Spoedaanpak Wegen* with which Rijkswaterstaat tries to improve 30 busy junctions in the Dutch road network. The *Spoedaanpak* is characterised by simplified procedures and accelerated construction. (Rijkswaterstaat 2010)

In February 2013 **this project has been awarded the Nederlandse Bouwpluim** in the category 'soil, high and waterways'<sup>12</sup>. The price has been awarded because the jury found that the cooperation between client and commissionee is characterised by "fast and effective collaboration" by means of "collaborative and interactive stakeholder management, mutual flexibility in the realisation phase and focus towards operational decision-making" (Stichting Nederlandse Bouwpluim date unknown).

### 3.5.1 Project organisation

The Poort van Bunnik is the consortium that is responsible for the realisation, financing and maintenance of the project. The consortium consists of BAM PPP, BAM Civiel, BAM Wegen, BAM Infraconsult and BAM Infratechniek. The Poort van Bunnik carries out the assignment for the client: Rijkswaterstaat.

### 3.5.2 Budget

The budget that is available for the A12 project is €260 million (net present value 2010). The project is awarded to the Poort van van Bunnik on basis of the economic most advantageous tender. (Rijkswaterstaat 2010)

### 3.5.3 The contract and the change procedure

In July 2010 Rijkswaterstaat and the Poort van Bunnik signed the contract and financial close is achieved in September 2010. The A12 DBFM project is the most recent (transportation) infrastructure project in the Netherlands that is completed (March 2013).

The change procedure in this project is very similar to the procedure laid down in the DBFM standard contract model (version 3.0). In the case project the procedure is characterised by a threshold of €100,000. This threshold is higher than in the other projects.



Figure 16 Route of the A12 project (Rijkswaterstaat 2009) and at the background the A12 (WESTRAVEN, which is not part of the project) (Multimedia Rijkswaterstaat 2004)

<sup>11</sup> Dutch: gebruik van de vluchstrook als spitsstrook.

<sup>12</sup> Dutch: GWW = grond, weg en waterbouw.





Figure 17 A1(M) DBFO project between London and Newcastle (Highways Agency date unknown)

## 4 Results

The major aim of this thesis is to gain an insight in the flexibility of the DBFM contract, which amongst others is provided by the change procedure in the contract.

There to 8 interviews were held; for each of the 4 case projects one with a representative of the client and one with a representative of the commissionee of the DBFM case projects. This is phase 2<sup>a</sup>, see sections 4.1 and 4.2. Subsequently (more than) 8 open interviews were held with 'independent' employees from clients, commissionees and financiers (or their advisors) in general. The results of this phase 2<sup>b</sup> are presented in section 4.3.

### 4.1 The changes in the case projects

Baarda, De Goede et al. (1998:148) present a set of guidelines for doing interviews, with which they draw attention to the fact that a researcher should be attentive to nonverbal signals of the informant while he is interviewing him, and also the authors advise not to be pleased with general or unremarkable answers. In order to touch upon these 'intangible' aspects of gathering data, in sections 4.1.1 – 4.1.4 an impression of the conversations is included.

#### 4.1.1 A59 DBFM Rosmalen – Geffen motorway

In an early stage of this research an orientation interview was held by telephone with one of the representatives of the Province of Noord-Brabant, which is the client of this project. This was done to find out how 'open' the contracting parties are to talk about changes (quite open) and to get an impression of the number of changes made after completion (14 in this case project).

Then, the real case study interviews for this project were held with representatives of the Province (2 risk managers) and the Poort van Den Bosch (1 operations manager). In both interviews the changes were discussed in quite detail and it seemed that the respondents felt comfortable with the subject, which is most likely because the representatives of the Province and the Poort van Den Bosch were both of the opinion that they cooperate well on the interpersonal level.

#### The changes in this project

In the exploitation phase of this project 14 changes have been proposed, the majority by third parties such as Rijkswaterstaat, municipalities or shop owners along the A59 route. See Table 6.

11 out of 14 changes are accepted; **one has been cancelled and settled in a different way**, i.e. outside the project; and the contracting parties are negotiating two changes currently, namely [#43] and [#44]. Further, although the standard DBFM contract (3.0) defines for it, the A59 DBFM contract is not characterised by an official threshold in the change procedure. To have a sense of the magnitude of the changes, in this research the 'virtual' threshold is set to €10,000.

Further, the interviews with the contracting parties took place 3 weeks after each other. It was seen that the Province' list consisted of 12 changes, whereas the Poort van Den Bosch' list consisted of 14 changes. It is observed that the Province' list was not up to date yet, but this is not a problem as they were aware of those.

#### Triangulation – what other resources write about the changes in this project

In 2011 the Province of Noord-Brabant and its advisors organised a meeting in which they did an assessment of amongst others the contract and its changes (Susanna 2011). It is discussed that 9 changes were made in the exploitation phase of the project up and until 2011. These

changes mainly originate from requests of surrounding municipalities, the national government and (other) third parties. This corresponds to the data gathered in this research.

Further is noted that the (third) party that requests the change has to assess whether the change is market conforming, because the Province of Noord-Brabant does not compensate the extra (indirect) costs of changes.

In general, the attendants of the meeting were of the opinion that the project's contract is 'good'.

	Change	Origin	Initiator	Proposed	Accepted	Costs	
			uncertainties exist at the	Formal request	Change signed by Province and sent to PvDB	≤ €10,000	> €10,000
#31	Layout of an intersection – lining, extra lanes, VRI, etc.	Reconstruction of the A2 road: interface with other (new) project.	Municipality Den Bosch /RWS	N.a. from interviews	N.a. but realisation in 2008		X
#32	Guard rail safe for motor vehicles	Guideline RWS (hooked loop)	RWS	Idem	N.a. but realisation in 2009		X
#33	Road signs for alternative routes in case of major accidents	Guideline RWS	RWS	Idem	N.a. but realisation in 2009	X	
#34	Camera placement for monitoring traffic	Request municipality DB: optimisation of usage of intersection	Municipality Den Bosch	Idem	N.a. but realisation in 2009	X	
#35	Road sign for holiday park	Request holiday park owner	Holiday park owner	Idem	N.a. but realisation in 2009	X	
#36	NDW poles for monitoring traffic	New technological development as poles are optimisation in traffic hindrance	RWS	17-7-2009	Cancelled and settled in a different way		X
#37	Road signs	Reconstruction of the A2 road: interface with other (new) project.	Contractor of A2 road project	17-11-2009	15-7-2010		X
#38	Road sign + separate construction for shop	Request franchise shop owner	Franchise shop owner	2-3-2010	19-4-2010		X
#39	Road signs for business park	Request municipality DB	Municipality Den Bosch	15-3-2010	23-8-2010		X
#40	130 kph road signs – after discussion and objection neighbours: 100 kph signs better to be recognised by colour-blinds	Legislation government	RWS	10-7-2010	16-8-2012	X	
#41	Adjustment usage mobile information trailer	Guideline RWS	RWS	10-12-2012	In progress		X
#42	Adjustment noise barrier	Guideline RWS	RWS	22-1-2013	In progress		X
#43	ZOAB composite	Proposal PvDB on basis of guidelines	PvDB	N.a. from interviews	In progress – no price	N.a. in project yet	N.a. in project yet
#44	Economise the road lighting	Measure government to cut expenditures	RWS	Idem	In progress – no price	Idem	Idem
<b>Total</b>	14						
<b>Value</b>	€600,000						

Table 6 Changes in the A59 DBFM project from completion certificate up and until 6 March 2013<sup>13</sup> (n.a. = not available)

<sup>13</sup> The date of the last interview for this case project.

#### 4.1.2 N31 DBFM Nijega – Leeuwarden highway

In the interview with the representative of the Bouwcombinatie Wâldwei (1 road operator) the changes in the exploitation phase of the N31 project were discussed in quite technical detail. Therefore, it was the longest interview of this research.

The interview with the representatives of Rijkswaterstaat (2 employees of the team that monitors the contract) was particularly meant to verify the data gathered from the interview with the Bouwcombinatie, and was useful for answering remaining questions.

It is observed that the contracting parties monitor the changes by means of a similar type of overview (some of the contracting parties do not use the same change numbers (#)).

Further, the interview with the Bouwcombinatie Wâldwei was held early February 2013 and the interview with Rijkswaterstaat midst April 2013. No additional changes were concluded in between.

	Change	Origin	Initiator	Proposed	Accepted	Costs
				First proposal	Signed by Client	No threshold, costs not to be published
#069	Change in opening regime <i>Fonejachtbrug</i>	Route for boats with standing masts not yet complete by Province of Friesland	RWS	26-2-2008	31-8-2008	-
#070	Specification for application road mark conform guideline CROW 207	Change in guideline CROW 207	RWS	11-4-2008	2-6-2008	-
#071	Procedure for changing rules and regulations	Indistinctness of what to do with new rules and regulations	RWS	16-1-2009	19-7-2010	No (direct) financial consequences
#072	Handrail aqueduct <i>Langdeel</i>	Construction cycle route at aqueduct by municipality of Leeuwarden, therewith changing safety standards	RWS	11-11-2011	15-12-2011	-
#073	Application road mark	See #70	RWS	30-11-2011	21-12-2011	-
#074	Temporary change of area of control because of <i>Haak om Leeuwarden</i>	Interface new project, other contractor	RWS	8-12-2011	24-2-2012	No (direct) financial consequences
#075	Adjournement <i>Raad van Deskundigen</i>	Insight of <i>Raad van Deskundigen</i> in utility and necessity of assembly of the board	RWS	8-12-2011	23-1-2012	No (direct) financial consequences
Total	7					
Value	€200,000					

Table 7 Changes in the N31 DBFM project from completion certificate up and until 17 April 2013<sup>14</sup>

#### The changes in this project

In this project 7 changes are concluded in the exploitation phase. These changes were initiated by the Bouwcombinatie Wâldwei, however, those are **deemed client changes**. That means that despite the commissionee initiated these changes, they are to be seen as the client's risk. The representative of the Bouwcombinatie explained, as it operates the road daily, it observes those changes earlier than Rijkswaterstaat and so initiates them.

Further, from Table 7 is observed that no changes have been cancelled in the exploitation phase, which is since 13 December 2007.

<sup>14</sup> The interviewees of both contracting parties have requested to present the facts delicately. Therefore, it has been agreed that the costs of each of the changes are not mentioned in this report.

#### 4.1.3 HSL-Zuid DBFM rail

With the representatives of ProRail (2 employees of the contract management team) the first case study interview of this research was held and so after this interview was more clear what type of questions can and should be asked. However, as the HSL-Zuid project is much-discussed, compared to other projects this interview was most challenging to start off with. It is observed that the representatives of ProRail gave answers with a 'political touch'. That means that their answers were very considered and discerned.

The focus of the conversation with the representative of Infrasppeed (1 contract manager) lay on the change procedure of the HSL-Zuid DBFM contract, whereas the focus of the interview with the representatives of ProRail lay on the number and type of changes.

Change	Origin	Initiator	Proposed	Accepted	Costs	
					≤ €30,000	> €30,000
Construction 4 AT stations	Technical insight in connection with test period	ProRail	N.a. from interviews	N.a. from interviews		X
Emergency platforms for emergency services	Request emergency services	State by instruction of emergency services	11-2009	Constructed but not yet paid for		X
Hectometre marker poles along the track	Technical insight in connection with functionality and failures	Infrasppeed (machinists)	Early 2009	Constructed medium 2010		X
'L1/L2 working zones' at Belgian border	Optimisation maintenance Belgium	Belgian Railways	2006	October 2009 agreement on costs and construction		X
Swan protection provisions	Technical insight in connection with dead or wounded animals in track	State	End 2009	No agreement about price and construction		X
Emergency lighting bridge Hollands Diep	Technical insight in connection with tuning of sub and superstructure	ProRail	N.a. from interviews	Cancelled because change too valuable		X
Making ERTMS more robust	Technical insight in connection with test period	ProRail	April 2012	In progress	N.a. in project yet	N.a. in project yet
<b>Total</b>	64					
<b>Value</b>	€48M for the above 7 known					

Table 8 Changes in the HSL-Zuid DBFM project from completion certificate up and until 26 March 2013 (n.a. = not available)

#### The changes in this project

Since December 2006, when the completion certificate of the HSL-Zuid DBFM project was issued, 64 changes are made. Because the number of changes in this project was too high to discuss in 1 – 1,5 hours in both interviews only 7 changes were discussed, see Table 8. It was up to the interviewees to decide about which changes the discussion was held. Further, unlike in the interviews with the contracting parties of the other case projects, an overview of the changes was not available during the interviews.

#### 4.1.4 A12 DBFM Utrecht Lunetten – Veenendaal motorway

As opposed to the other interviews that were held in phase 2<sup>a</sup> the emphasis of the interviews with representatives of Rijkswaterstaat (1 employee of the contract management team) and the Poort van Bunnik (2 employees of BAM Wegen and BAM PPP) was on their view towards changes and flexibility. This was possible because only one change was made in the exploitation phase of the project.

Further, in the interviews the fact that this case project has been awarded the *Nederlandse Bouwpluim* due to the **stakeholder oriented mind-set the parties have adopted during the construction phase** was briefly discussed.

An orientation interview has been held with a representative of Rijkswaterstaat (1 procurement manager) in an early stage of this research project.

	Change	Origin	Initiator	Proposed	Accepted	Costs		Phase
						< €100,000	> €100,000	
KWOG_34	Measures to counteract vibrations <i>Koolweg</i>	N.a. from interviews	RWS	N.a. from interviews	27-9-2012	N.a. from interviews	N.a. from interviews	Availability
KWOG_35 & OWOG_18	130 kph road signs	Legislation government	RWS	Duration circa 2 months	27-9-2012	Idem	X	Availability
KWOG_36	Pollution at junction <i>Veenendaal – West</i>	Insight in soil conditions	N.a. from interviews	N.a. from interviews	2-10-2012	Idem	N.a. from interviews	Availability
KWOG_36	Guard rail at <i>Veenendaal – West</i>	N.a. from interviews	Idem	Before completion certificate	N.a. from interviews	Idem	Idem	Availability
KWON_7	Change in the number of maintenance nights	Accelerated planning by Pvb	Pvb	N.a. from interviews	8-10-2012	Idem	Idem	Availability
KWON_8	Consequences final report sustainability	N.a. from interviews	Pvb	N.a. from interviews	N.a. from interviews	Idem	Idem	Availability
OWOG_17	WKS ( <i>wegkantstation</i> ) software traffic control upgrade	Definitive version unknown in realisation phase (issue requirement)	RWS	N.a. from interviews	In progress	Idem	X	Availability
OWOG_19	Fly-over ring road <i>Houten</i> (project <i>SALTO</i> )	Interface with foreseen project, but not incorporated in contract	RWS	N.a. from interviews	In progress	Idem	X	Exploitation
<b>Total</b>	1 (8 inclusive availability phase)							1
<b>Value</b>	€2M for							

Table 9 Changes in the A12 DBFM project from completion certificate up and until 6 March 2013 (n.a. = not available)

#### The changes in this project

8 changes have been made since the issue of the *availability* certificate, see Table 9. OWOG\_19 is the only change since the issue of the *completion* certificate (March 2013). The other changes were remaining items on the 'snag list' mainly, which had to be finished by the EPC contractor before completion. Although this research focuses on exploitation, in both interviews those changes since the availability date were discussed as well.



## 4.2 Categorisation of the changes in the case projects

Sub question 2 of this research questions what types of changes are proposed and made in practice on the longer term in infrastructure projects in the Netherlands. Thereto this research divides the changes in categories, which means that the data is classified. (Ghauri and Grønhaug 2005:206-212) The categories are: origin, value, impact and type. See chapter 2.

### 4.2.1 General characteristics

Case project	A59	N31	HSL-Zuid	A12	Total
Number since completion date	14	7	64	1	86
Of which accepted	11	7	37	0	55
Of which in negotiation	2	0	22	1	25
Of which cancelled	1	0	5	0	6
Total value of changes accepted	Ca. €600,000	Ca. €200,000	Ca. €48M for 7 changes known from interviews	Ca. €2M	
Percentage of contract value	Ca. 0,25%	Ca. 0,25%	Ca. 1,5-2%	Ca. 0,75%	

Table 10 General characteristics of changes in the exploitation phase

Considering the 3 road projects and the rail project, the number of changes that was initiated in the case projects differs significantly. See Table 10; 64 out of 86 changes accrues to the HSL-Zuid project.

Further, in the 4 projects only circa 7% of the changes that was initiated in the exploitation phase has been cancelled. However, in the N31 and A12 projects no changes were withdrawn.

Also, it can be seen that the relative aggregate value of the changes ('percentage of contract value') in the A59 and N31 projects is significantly lower than in the other two projects. However, in these case projects no real major changes were proposed.

### 4.2.2 The changes according to origin

	Case project	A59	N31	HSL-Zuid	A12
	Total	14	7	64	1
Internal	Client change	0	7	64	0
	Commissionee change	1	0	0	0
	Other	13 external	0	0	1 external
External	Change of law	6	3	0 of 7 known	0
	Other, i.e. requests third parties, interfaces with other projects etc.	7	4	7 of 7 known	1

Table 11 Changes after completion of the case projects: according to origin

From the case projects it can be concluded that the **majority of the changes has an external origin**. These are proposed by third parties or originate from for example a change in rules or legislation. However, the fact that third parties are not party to the DBFM agreement brings about that those changes are 'deemed client changes', also see section 4.1.2. Except for the

A59 DBFM, this means that third parties' requests have to be proposed by the client of the project.

Whether a change from 'outside' the project is indeed a (deemed) client change depends on the allocation of risks and responsibilities. For example the risk for changing legislation is assigned to the client in each of the case projects in this research, which means that the client bears the costs of it. However, in the A59 DBFM project the contracting parties agreed that the party that initiates a change pays for it. This also goes for third parties. See [#35], [#38] and [#39] in Table 6. These are changes in which road signs were installed on request of shop owners, who paid for those themselves.

Further, except for the Poort van Den Bosch that has proposed to use a different composite of ZOAB<sup>15</sup> on the A59 motorway [#43] no changes have been initiated by the commissionee in the exploitation phase of the case projects.

### 4.2.3 The changes according to value

The HSL-Zuid and the A12 DBFM projects are characterised by an official threshold value in the change procedure. This means that the changes can have a value below or above that threshold and so changes are denoted as 'small' or 'other'. A change above the threshold implicates a due diligence process by the case project's lenders and/or a change which is paid by the client instead of the change being paid from the commissionee's risk allowance (if applicable).

Case project	A59	N31	HSL-Zuid	A12
Total	14	7	64	1
Threshold	Fictive €10,000	Fictive €10,000	Ca. €30,000 (indexed)	€100,000
Below threshold	5	4	Ca. 6	0
Above threshold	7	3	Ca. 58	1
Other	2 n.a. yet in project	0	0	0

Table 12 Changes after completion of the case projects: according to value (n.a. = not available)

Because the threshold values in the DBFM case contracts differ significantly, there is little use in comparing the projects. Despite, from Table 12 is observed that changes in 3 out of 4 case projects are characterised by values both below and above the change procedure's threshold. **Only several relatively major changes have occurred** of the changes that have a value above the threshold. Major changes have a large value and (can) have a big impact on the risk profile of the project. In England the HM Treasury (2012a:81) observed that "large-value changes typically reflect major changes in strategy or policy that could not have been anticipated when the contract was signed" and as such those changes "tend to occur less frequently".

In the A59 and N31 projects the division between below and above value categories approaches a 50/50 distribution. This pattern remains unchanged if the fictive threshold, which was established in order to get an impression of the magnitude of the changes, would be set at for example €25,000.

Also it was observed that the HSL-Zuid DBFM is the only case project in this research in which the commissionee has to pay a change below the threshold value from a special risk budget. Above the threshold value a change is paid for by the client, which means that circa 90% of the changes is paid by ProRail, i.e. the state of the Netherlands.

<sup>15</sup> A type of asphalt concrete with which traffic noise and rain gutter is reduced due to its 'very open' structure.

#### 4.2.4 The changes according to impact

Case project	A59	N31	HSL-Zuid	A12
Total	14	7	7 known	1
Financial only	1	1	0 of 7	0
Works and/or services	13	6	7 of 7	1

Table 13 Changes after completion of the case projects: according to impact

Changes that have a consequence for the works and/or services imply that the contractors have to carry out additional works that did not form part of the original contract. For the client, these changes are characterised by financial consequences as the contractor's activities require a financial compensation. As a result, the two categories in Table 13 are not mutually exclusive.

An example of a change in the works and/or services can be seen in the HSL-Zuid project. Namely, on request of machinists of the HSL trains Infraspied installed marker poles along the track. After these are constructed they have to be maintained as they get dirty and damaged.

Only 2 changes – that is about 7% of 29 changes known – have a consequence in terms of costs only. These were: the change of the opening regime of the *Fonejachtbrug* as the bridge had to be opened for recreational boats [#069 of the N31 project]; and [#44 of the A59 project] the measure of the Dutch government to save expenditures on maintenance costs of the road network, which is to economise lighting (lights will be switched off between 21:00 or 23:00h and 5:00h).

#### 4.2.5 The changes according to type

Table 14 defines 'use' of the asset and the 'standards' in the contracts. A change in use or functionality refers to how the asset is used or how it functions; and specifications and standards is related to maintenance.

Case project	A59	N31	HSL-Zuid	A12
Total	14	7	7 known	1
Use or functionality	13	6	6 of 7	1
Service specifications or performance standards	1	1	1 of 7	0

Table 14 Changes after completion of the case projects: according to type

It is observed that to a large extent the pattern in this Table 14 corresponds to the pattern in Table 13 because the changes that have to do with the use or functionality have an impact on the works and/or services.

For example in the A59 project change [#44], see section 4.2.4, corresponds to the one and only change in the category service specifications or performance standards. In the HSL-Zuid rail project the 'L1/L2 working zones' change aimed at changing the security policy of the project with which parts of the track can be put out of service in case the Belgians are maintaining the track.

Finally, in the N31 highway project the change in service specifications is change [#74], which is a temporary change in the area that the DBFM contractor monitors. This was a solution to the fact that in vicinity of the DBFM project the *Haak om Leeuwarden* is constructed by a different contractor, moreover that the route of that project has an interface with the N31 Wâldwei at the western part of the DBFM project and thus with this change a part of the DBFM project is

temporarily handed over to the contractor of the *Haak*. When it has finished the project this contractor hands back the area to the DBFM contractor, i.e. Bouwcombinatie Wâldwei.

#### 4.3 Interests of clients, commissionees and financiers towards changes

Phase 2<sup>b</sup> of this research looks into the interests and viewpoints of the actors that have a large role in the DBFM contract with respect to changes and flexibility. These main actors are the client, the commissionee and the financiers. Between those three parties there is a so-called tripartite agreement.

Table 15 is a brief overview of those interests and viewpoints, which are divided into two parts. This is because it was observed that on the one hand those interests and viewpoints indicate the opinion of the respondents (and the organisation or the company they represent) towards changes and on the other hand those interests and viewpoints indicate on which criteria an assessment of a change proposal is done. In appendix A6 the complete analysis from which Table 15 is derived can be found.

##### 4.3.1 Interests of clients

From Table 15 is observed that in the case projects Rijkswaterstaat or ProRail is the party that is and feels responsible for wishes and demands of (external) stakeholders.

Therefore, the public client assesses change proposals not only on the nominal value (the 'financial' costs) but on their aggregate value to society. This means that for the public client **(social) benefits of a change should outweigh the costs of it**. And because Rijkswaterstaat and ProRail (should) act in the benefit of the public, they take into account more abstract project goals. For example an interviewee of Rijkswaterstaat said that "...we do not (directly) have project results in relation to the changes (...) but our general goals are traffic flow and safety...".

##### 4.3.2 Interests of commissionees

In the case projects the commissionee is a special purpose company (SPC) that has 'back-to-back' contracts with its contractors and a direct agreement with the financiers. Because of those back-to-back contracts the EPC and MTC contractors are much more risk taking than the SPC. Therefore their interests (can) differ and so these are discussed separately here.

###### - The SPC

With respect to changes is observed that the SPC particularly *advices* the contractors on changes, for example on withdrawing or rejecting those. This is because the contractors bear the (construction) risks in the DBFM organisation.

According to an interviewee the SPC is especially interested to **keep risks for its organisation as low as possible** because "... it is a condition to obtain financing..." from the financiers. Statements from other respondents affirm that for the SPC financing is a recurring subject. In the HSL-Zuid project the commissionee can reject a change proposal if a change risks financing, see also the tables in appendix A6.

###### - The contractors

The EPC contractor is in charge of the realisation and is therefore **not in favour of a change if that change is on the critical path**. This can disturb his planning, which decreases the likelihood that the milestone 'availability date' is achieved timely. The MTC contractor has a less tight planning and is particularly interested in the **quality and thus the availability of the asset**. Therefore, it wants to carry out that change itself as to stay in control of the asset, in order to safeguard the availability of the infrastructure.

To both 'types' of contractors **changes are turnover** with which in fact money can be earned.

#### 4.3.3 Interests of financiers

Financiers can be divided in several 'types' such as financiers that invest in the private equity or in the debt equity of the SPC. Or for example financiers that are focused towards the longer term of their investment (10 to 15 years) instead of a relatively short term (one to a few years).

From the interviews it is observed that financiers *in general* are interested in the **impact of a change on the risk profile** of the DBFM project. This means, whether the availability of the asset and thus the cash flow of the project (the availability fee the SPC receives) is at risk. In turn the cash flow of the project generates the income of the financiers. Therefore financiers, i.e. the financiers' financial advisors, assess whether changes 'harm' the cash flow of the DBFM project in the exploitation phase. However, although changes are not regarded by financiers with 'disfavour' it is observed that 'every type of flexibility' and renegotiation of (basic) contract terms "...has a price..." [institutional investor].

Additionally it was observed that the fact that financiers have arranged *their* debt with *other* financiers plays a (minor) role in DBFM contract flexibility. This is because if the changes influence the financiers' income negatively, the financiers cannot fulfil their liabilities to creditors as those loans are fixed. Lauwers (2008) clearly describes how this system, in which banks lend money to each other, has aggravated the current credit crisis.

Interests and viewpoints to changes			
Why changes?	Client	Commissionee SPC	EPC and MTC contractors
	Rijkswaterstaat has the responsibility to react to wishes from society. [Client] "... the availability of the asset is important for ProRail..." [Client HSL-Zuid] "... we do not (directly) have project results in relation to the changes (...) but our general goals are traffic flow and safety..." [Rijkswaterstaat A12]	It is the responsibility of the commissionee to comply with rules and regulations, and so it will initiate changes if legislation changes. [Commissionee N31] "... the commissionee will particularly appeal to the change procedure if something disappoints - not if something turns out better than expected..." [Legal advisor A]	Changes are turnover (in that respect change as much as possible). [Commissionee A59]
Assessment of change proposals	Changes should be assessed on their aggregated value (to society), not solely on if these are technically feasible for example. [Client A12] The benefits of a change must outweigh the costs of it. [Client HSL-Zuid] Remain the contract's initial division of responsibilities in case of changes - "... the State should not incur extra risks from a proposed change..." [Client HSL-Zuid]	"... in case of major changes? We maybe negotiate that the guarantee for the availability of the asset is reduced..." [Commissionee A59] "... there is a very little chance that Infraspeed will propose more than 5 changes the coming 20 years..." - the system functions and only if a change delivers a lot of additional value the change is accepted. [Commissionee HSL-Zuid] The goal of the SPC is to keep risks as low as possible - "it is a condition to obtain financing..." [SPC]	To "...be in power..." of the asset and to exert control over its quality - the commissionee wants to carry out changes itself as it is responsible for the asset. [Commissionee A59] "... it is conflicting to operate what a different contractor has constructed..." [Commissionee N31] In case of major changes the contractor(s) presumably place a request for reduced guarantees within the contract. [Commissionee A59] The interest of the contractors (and the SPC) is to accomplish the project timely, i.e. to meet the availability date. [SPC]
			Financiers
			"... it is not the business model of the financiers to change the system constantly..." [Financial advisor] "... if the change is non-material or does not influence the availability fee, we are okay with the change and we have no interest in it..." [Institutional investor] "... our viewpoint is quite financial: if the contract is watertight we merely present our desired yield..." [Institutional investor] "... we do not view flexibility of the contract with disfavour, however everything has a price..." [Institutional investor] Financiers assess the impact of changes on the risk profile of the project. [Client A12] In case the contracting parties wish to change the contract in whatever form, the financiers need to be involved as they want to make sure that the stipulations do not harm the cash flow. [Legal advisor A] Every form of flexibility is an insecurity that makes a DBFM project less attractive as a commodity (to invest in). [Legal advisor A] Financiers have made agreements about the loan with their providers of capital - the "... adjoining redemption cannot be altered..." [Legal advisor B] The cash flow is reduced if a change has to be paid from the OPEX by the commissionee, and this is less comfortable for a bank. [Financial advisor] "... financiers are interested in the quality of the changes; (...) not only that the change is accommodated by the commissionee, but also how..." [Financial advisor] For the institutional investor it is important that as few risks as possible are allocated to the SPC. [Institutional investor]

Table 15 Interests and viewpoints of parties to changes; why they desire changes (or not) and how they assess a proposal (respondents [between brackets]: see the confidential appendix)

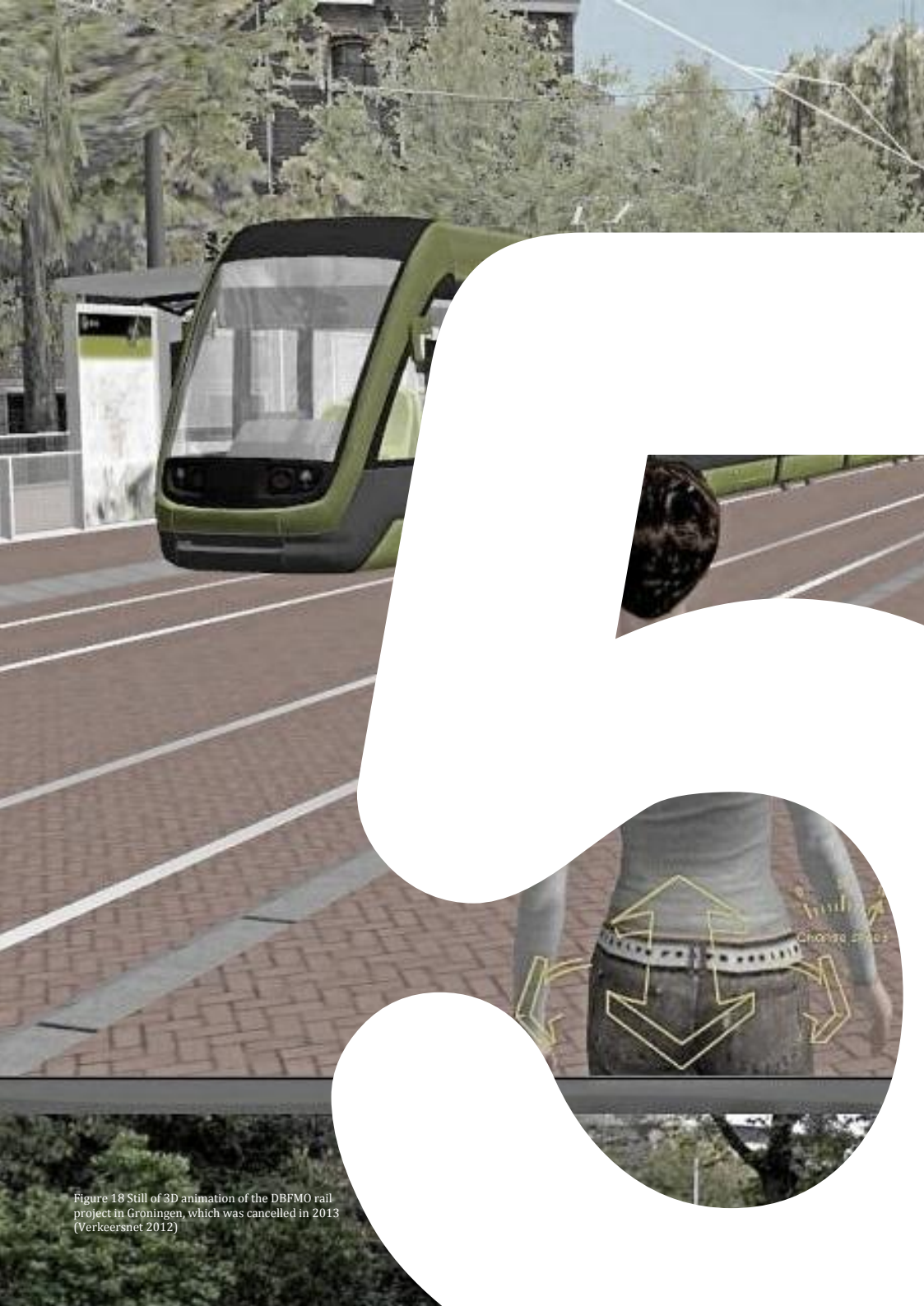


Figure 18 Still of 3D animation of the DBFMO rail project in Groningen, which was cancelled in 2013 (Verkeersnet 2012)

## 5 Analysis

In the previous chapter the results of the research are presented. This analysis shows how those results (phases a and b) should be interpreted.

### 5.1 Analysis of the categories of changes

In the analytical framework in chapter 2 four categories of changes were provided: origin, value, impact and type. In this section is concluded that the category 'origin' present valuable results on what flexibility is *necessary*. Further, from the categories 'impact' and 'type' is observed that the majority of changes has a functional purpose.

Moreover, in this analysis is concluded that the DBFM contracts in the case projects could put into effect the proposed changes by means of the change procedure. What is important, is that those changes had an external origin mainly, which is an indicator of the dynamics of the project's context.

#### 5.1.1 General characteristics of changes

General characteristics of the changes in the case projects were presented in Table 10. This section presents the discussion towards the changes' general characteristics.

##### - Quantity of changes

Firstly, it is observed that the quantity of changes is an indication of the influence of the dynamics of the project's conditions. This is in contrast with proposition I, which states that the degree of flexibility is determined by the number of changes. In that respect, one respondent said that "... maybe the DBFM model is only suitable (...) if the project can function without interferences of other projects...". In other words, **the number of changes follows from interactions with external conditions**, such as interfaces.

Cross-case wise, the number of changes that is concluded in the HSL-Zuid project is outstandingly higher than the number in the road projects. There is a general belief that this is because the rail project is characterised by the use of new techniques and consequently the test period thereof brought about many optimising changes. Further, "...of 64 changes, 22 have an origin in the realisation phase of the project, i.e. these changes are loose ends from the realisation phase that needed to be finished..." and that "...many of the changes are made from a technical point of view..." [client HSL-Zuid].

##### - Cancellation, negotiation and rejection of the changes

Whether changes stay long or short in the change procedure is an indication of **how 'smoothly' these are processed through the procedure**. However, whether it is run through supply, is dependent on several factors. For instance on if the change procedure is SMART, but moreover, on how the parties deal with it. Namely, in the HSL-Zuid contract, the contracting parties have an issue with the change procedure as they disagree about how it should be run through at one point. Most likely, this explains why there are 22 changes in negotiation.

##### - Total value of the changes

The total value is merely an indication of the direct and transaction costs of the changes. That is insignificant for this research insofar it is not an indicator of flexibility. It gives an idea of the magnitude of the changes.



### 5.1.2 The changes according to initiator and origin

It is seen that **the majority of the changes has an external origin**. Why is this so?

Of course, that depends on the categories that are used, in other words, how an external change is determined. But what is more important, is that the number of external changes is an indication of the dynamics in the project's context.

Namely, due to the fact that the contracting parties are focused on carrying out the project according to contract, the majority of the changes is brought about by the 'outside world' rather than from within the project. And so external changes result from requests of third parties, from changes in rules and regulations and from interfaces with other projects. These dynamics are in principle outside the control of the contracting parties. But due to the fact that third parties cannot directly propose for a change, **such changes are usually for the account of the client**. This does not go for the A59 project; the data is distorted by the fact that the official client of the project, the Province, is not liable for those changes and passes these on to Rijkswaterstaat.

Two examples illustrate changes resulting from interfaces, which are brought about in each of the 4 case projects. The first is the opening regime of the *Fonejachtbrug* [#069] in the N31 project. In the final plan, the bridge stays shut. However, due to the fact that the Province of Friesland had not yet realised the planned 'standing masts' route<sup>16</sup> the bridge had to be opened and so the opening times were adjusted temporarily. The other example is the one and only change in the A12, the fly-over brought about by the N412 highway. In the planning phase of the A12 DBFM project Rijkswaterstaat and the Poort van Bunnik suggested to include this interface in the DBFM scope. However, for the Province of Utrecht, which is the principal of the *SALTO* project to which the fly-over belongs, it was not an option to decide on that already, as it did not have a detailed design at the time the A12 DBFM is drafted.

### 5.1.3 The changes according to value

In the analysis is observed that whether the changes are characterised by a value below or above the threshold depends on what the change entails. In other words, the direct costs of a fly-over are larger than the direct costs of installing a road sign. The distribution between those two values approaches about 50/50. However, of those changes above the threshold value, the majority cannot be characterised as a major change. HM Treasury (2012a:80) notes that in their evaluation the majority of the changes "tend to be small in relation to the capital value of the transaction". The distinction between real costs and transaction costs that underlies that statement is not explicitly made in this research, also see section 8.2.

Further, it is observed that the distinction is particularly interesting if the commissionee has to pay for changes below the threshold *itself*, i.e. if the commissionee has incorporated a risk allowance.

### 5.1.4 The changes according to impact

Many of the changes in the case projects have an impact on the works and/or services. Therefore, it is believed that many of the changes have the aim to alter the asset. This is due to the fact that these changes stem from the fact that the contracting parties observe that the asset does not function according to rules and regulations.

### 5.1.5 The changes according to type

The last category is the type of change. From the cross case analysis it can be concluded that most changes alter the use or functionality of the asset, that means: how it used. For example a

road sign for shop owners in A59 motorway project, or the swan protection provisions at the HSL-Zuid track to prevent that the trains break down when a swan ensnares the overhead wires and lands in between the rails.

## 5.2 Analysis of the interests of clients, commissionees and financiers

Sub question 3 is about the role of the interests of the contracting parties play in making changes. From the analysis is seen that the financiers have a large role, which particularly influences the ease with which the change procedure can be run through: due to their involvement the procedure takes longer and is more extensive. Further, the general belief is that because of the involvement of the financiers' and the contracting parties' advisors transaction costs are relatively high, with which change prices increase, and also that it takes longer than necessary to process a change through the procedure.

### 5.2.1 The clients

From the interviews with the representatives of the clients, both in phase 2<sup>a</sup> and 2<sup>b</sup>, it is concluded that they struggle to find the balance between external requests for changes, usually brought about by third parties or by changes in regulations and law, and to make as few changes as possible. Namely, on the one hand the public client has a need to serve society and thus to respond to such requests (because who else does). On the other hand a public client has to spend tax payer's money as responsibly as possible, which in this research means: make as few changes as possible and if necessary, pay market conforming change prices, i.e. low transaction costs in relation to the direct costs of a change.

### 5.2.2 The commissionees

Further, a commissionee consists of a SPC and contractors. The SPC functions on an abstract level than the contractors because the SPC acts as the official contracting party for the client and the financiers. As a whole, the commissionee is focused towards managing risks, as changes can influence the risk profile of the project and therewith the availability fee of the DBFM project. The interests of the SPC and the contractors are therefore discussed separately.

#### - The SPC

Being the official contracting party of the DBFM contract, the SPC is mainly concerned with the financial aspects of changes and therefore is focused on maintaining the commercial and interpersonal relationship with the financiers.

In general the SPC is willing to change the asset or the contract, as long as the works inherent to a change are compensated by the client, or if the commissionee's guarantees are reduced. SPC's emphasis that a steady cash flow is very important, as it is the SPC's responsibility to pay back the debt equity plus interest to the financiers of the DBFM project.

#### - The contractors

By means of back-to-back contracts the risks for realisation and maintenance are passed on to the contractors. In other words, are to be seen as the responsibility of the EPC and MTC contractors. Therefore, these contractors are focused towards managing those risks. The Poort van Den Bosch said: "... [in general, we want] to be 'in control' of the asset and its quality..." and the (EPC) contractor of the Poort van Bunnik: "... another contractor in the scope will surely damage our works..."

<sup>16</sup> Standings masts = masts (of sailing boats) that cannot get down, in order to pass bridges for example.



The MTC contractors are concerned with changes in the exploitation phase of the case projects. Sometimes they have to advise on the maintenance costs of a change that is put into effect in the realisation phase.

Further, the contractors in the case projects said to provide for 'reasonable' change prices. But for the contractor it usually does not matter who actually pays for a change, as long as they get a financial compensation for the additional works.

A few of the representatives of the commissionees noted that for the contractors a change has a positive side: it is turnover. In that respect the representative of the Poort van Den Bosch notes "... [to] change as much as possible...".

In practice the boundary between the SPC and the contractors is less strict as staff from the SPC is often employed with the MTC contractor for example. Those employees *can* have conflicting interests as they act on behalf of two different parties simultaneously.

### 5.2.3 The financiers

Thirdly, the financiers have a large interest in the cash flow of the project. However, as the commissionee is responsible for that, the role of the financiers is therefore limited in practice because there is a very big incentive for the commissionee to honour the debt. In principle the financiers' technical advisor assesses the changes. It is seen that in some instances "... the financiers have never visited the project..." [commissionee HSL-Zuid] – which is not necessarily an issue.

To gain an understanding of how financiers consider changes, Equation 1, which is the ratio the financiers use for the debt service of the commissionee, is included in this report. The ratio gives an indication of whether the commissionee can catch up with its obligations. Namely, if the *ADSCR* drops below 1 the SPC is in default. Imagine the following example, in which the commissionee has to finance a change. This reduces the *CFADS* as that is an operational expenditure. Consequently, the numerator of the formula decreases and as it has agreed upon with the commissionee to fix the *ADSCR* and the *DS* the financiers start to worry that these agreements come into play.

$$ADSCR = \frac{CFADS}{DS} \geq 1,2$$

*ADSCR* = annual debt service cover ratio

*CFADS* = cash flow available for debt service = availability fee – operational costs

*DS* = debt service = redemption inclusive of interest

Equation 1 The annual debt service cover ratio, one of the most important ratios for (DBFM) financiers

### 5.2.4 The contracting parties' view on each other's interests

For a complete view of the interests of the contracting parties and the financiers, some statements that the actors made about each other are included here.

The clients tend to think that the price the contractor offers for a change is not market conforming. However, they acknowledge that it is 'fair' for the commissionee to earn money with the project as the commissionee is a commercial company. In that viewpoint one of the respondents was of the opinion that "... both [contracting] parties must be aware of the fact that if either one of them offers a change proposal, the other in principle requires a compensation...". Further, clients usually are aware of the fact that the commissionee does

not initiate a lot of changes, but that if they occur it prefers to carry out the change himself, and moreover that it has to discuss it with the financiers.

Contrary, many of the respondents of the commissionees are aware of the fact that they cannot seclude themselves from the dynamics that occur outside the project (and thus outside their control).

## 5.3 Analysis of the propositions of the analytical framework

In this section the 4 propositions that the analytical framework brought about are analysed. The propositions are tested by means of the results of this research. It appears that **none of them holds completely true**.

### 5.3.1 Proposition I

The first proposition of the analytical framework states that:

*The more changes can be made the more flexible the DBFM contract is.*

From the case study interviews only several affirmative statements have been retrieved to this proposition. However, more important are the statements that assert the opposite. For instance, it was noted that "...flexibility is not about how many changes, but about how changes are absorbed by the contract. Namely, if 100 changes are absorbed not very smoothly this is not very flexible whereas 1 'supple' change is an indicator of flexibility..." [legal advisor B].

As seen in section 5.1.1, the conclusion to this proposition is that the number of changes (alone) is not an indicator of flexibility of the DBFM contract. Moreover, as it is not a goal to make changes, it is believed that **the number of changes should not be an indicator for the flexibility of the DBFM contract** as it is rather about the quality of the change.

In addition, whether changes are made is dependent on the stability of the 'environment'. This is confirmed in the interviewees of amongst others the Province of Noord-Brabant and ProRail. The number of changes "...says nothing about flexibility of the contract...". Thus, flexibility does not depend on the number of changes, but is about "...the room to manoeuvre in the contract..." [client A12] that is the space there is to act flexible within the procedure.

### 5.3.2 Proposition II

The second proposition assumes:

*There is flexibility of the DBFM contract if there is little penalty in time, costs, effort or performance.*

This proposition does not hold true as there is a clear indication that solely the aspects of time, costs, effort and performance do not determine whether there is flexibility. Namely, in the case projects many interviewees were of the opinion that there is flexibility, despite that they see disadvantages in terms of time, costs and effort. Therefore, it is concluded that the definition in a broad sense says nothing about the flexibility of the DBFM contract.

It is important to understand that the degree of flexibility seems to be determined by how the parties deal with the contract. For example, the representative of Bouwcombinatie Wâldwei noted that whether the procedure is difficult, which means, cannot be run through smoothly or is inflexible, depends on 'who you are dealing with'. For the representative of Rijkswaterstaat in the A12 project flexibility means 'to find another way of filling in the contractual obligations'.

## Interpretation of the penalties

Table 16 provides an overview of the penalties for each of the contracting parties in the case projects (see also appendix A7). The last column in the table indicates whether the parties are of the opinion that their project's DBFM contract provides for flexibility.

In the interviews it was discussed whether there was a – a – penalty in the aspects as defined by Upton. Three classes are defined thereto. At first from the interviews can be observed that there is less than little or no penalty. In principle a penalty is something that is 'negative', which means that the littler the penalty is, the more positive **[+]** the situation is. Secondly, the table can indicate that there is more than little penalty, which is 'negative' **[-]**. And **[0]** means either that there is no clear indication from the interviews or the parties are indifferent to the aspect.

It is analysed that for each and every of the case projects there is a penalty in one or more of the aspects, except for the A12 project. In the HSL-Zuid project the client is confronted with the most disadvantages. Representatives of ProRail find that **price and scope negotiations are per definition "...painful and lengthy..."**. However, again is seen that flexibility of the contract does not depend on the change procedure, but on the 'people involved'. This also goes for the parties in the A59 project for example; although there are penalties, both parties are of the opinion that they and/or the contract are/is flexible.

Time and effort seem to be closely related to each other; when there is much time needed to process a change, this usually also takes a lot of effort, or vice versa – except for the A59 project. Below, each of the aspects is discussed separately.

### - Penalties in terms of time

Most of the penalties - 3 (thus relatively few) - occur in time. However, although in the case projects throughput times are not always met, usually, such as in the A59 project, this is not a problem; neither of the contracting parties feels that this reduces the flexibility.

The representative of the Bouwcombinatie Wâldwei is confronted with longer throughput times, despite that changes are discussed upfront. The representatives of ProRail see the SPC as a 'service hatch' that has few personnel. This can be a reason for the HSL-Zuid project why the process is lengthy in the view of the contracting parties in the project.

### - Penalties in terms of costs

None of the commissionees is confronted with disadvantages in costs. The belief is that this is due to the fact that they do no initiate changes and therefore do need to bear the consequences thereof. The representatives of the Poort van Bunnik: "... [we] do [in principle] not care about who pays for it..." which means as long as they are compensated the works inherent to a change, it is fine.

On the other hand, there is only 1 penalty for the clients of the case projects: for ProRail in the HSL-Zuid project. One of the representatives mentions that it feels that in DBFM parties are "...bound to each other..." which means that the contract is a 'tommy' (which does not sound very positive). Further, it is of the opinion that **change prices in a DBFM are never market conforming**.

The A59 is special amongst the 4 projects. Because of the structure of the organisation, i.e. that the Province is not responsible for the road network, the Province passes on the costs to Rijkswaterstaat.

Client	Time	Costs	Effort	Performance	Flexibility?
<b>A59</b> Client Province of Noord-Brabant	<b>[-]</b> Throughput times are found "ridiculously long..."	<b>[+]</b> Costs of changes are "peanuts..." and are paid by third parties.	<b>[+]</b> The initiator has to request permits for a change if necessary.	<b>[0]</b> Focused on a smooth handover to Rijkswaterstaat in 2020 only.	<b>[Yes]</b> "...we are flexible in all [our] aspects..."
Commissione Poort van Den Bosch	<b>[+]</b> "...we have no issues with the throughput time of the procedure..."	<b>[+]</b> "...total costs are not much..." and the principle is that the third party pays	<b>[0]</b> Extra communication with RWS is necessary but this is not an issue.	<b>[0]</b> N.a. from interviews (thus maybe not an issue).	<b>[Yes]</b> "...we deal with issues very flexibly..."
<b>A12</b> Client Rijkswaterstaat	<b>[0]</b> "...time is no issue for us (...) because the contractor works out the proposal..."	<b>[+]</b> As the client and commissionee withdraw information from RAW, no issues on price.	<b>[+]</b> No (major) discussion and the team spends only little time on the contract management of the project	<b>[0]</b> There is no particular goal for this project.	<b>[Yes]</b> "...[for us there is] no need to change the procedure..." and "...in principle we can formalise all changing circumstances..."
Commissione Wâldwei.com bv	<b>[-]</b> Throughput times are exceeded which does not promote the progress of the process..."	<b>[0]</b> No penalty, no concrete issues.	<b>[0]</b> Interfaces for example are discussed upfront, but no concrete issues.	<b>[+]</b> Project focused towards positive financial result: no changes too expensive.	<b>[0]</b> "...whether the procedure is difficult depends on how you deal with it yourself..."
<b>HSL-Zuid</b> Client ProRail	<b>[-]</b> Discussed changes took much longer than the procedure describes.	<b>[-]</b> Change values are high (direct and transaction costs) and change prices in DBFM are never market conforming..."	<b>[-]</b> Effort in change procedure internal procedure is long; "...there is not-availability of personnel..."	<b>[+]</b> Changes have a functional aim: to increase or decrease performance of the rail.	<b>[0]</b> "...flexibility does not depend on procedure..."
Commissione Infraspeed	<b>[0]</b> Steps in the procedure are not skipped. Throughput times are not always met but this is not an issue really.	<b>[+]</b> The client has paid for all the changes so far. Infraspeed can reimburse the costs.	<b>[-]</b> Above the threshold value processing a change is a "whole fuss because many signatures are necessary..."	<b>[0]</b> It processes a change if the clients wants to, but the goal is to changes as little as possible.	<b>[0]</b> Infraspeed did not really 'need' flexibility, but the interviewee has given no indication that the contract is inflexible.
<b>A12</b> Client Rijkswaterstaat	<b>[+]</b> The change procedure is processed smoothly and the client has no issues.	<b>[0]</b> Though prices are higher than market prices, the costs are relatively low.	<b>[+]</b> The contractor is working on a change in the realization phase before the client has asked him to do so.	<b>[+]</b> The responsibility of RWS is to promote the interests of the public, and the change do not deviate from that.	<b>[Yes]</b> "...there is room in the procedure..."
Commissione Poort van Bunnik	<b>[+]</b> Though the procedure has 'never' been followed, there is no issue as it is processed on basis of mutual trust.	<b>[+]</b> Rijkswaterstaat pays for the change and the adjoining preparation costs.	<b>[+]</b> Issues are discussed in informal meetings yet in the procedure there is consequently no (t much) effort.	<b>[0]</b> Goal is to achieve milestones; changes should not disturb the construction process.	<b>[Yes]</b> "...the contract is flexible, it can take a lot..."

Table 16 Penalties for the contracting parties in terms of the four aspects of flexibility as defined by Upton (n.a. = not available)

	Time	Costs	Effort	Performance	Flexibility
<b>Clients</b>	[-] to [+]	[-] to [+]	Mainly [+] but [-] also	Equally [0] and [+]	Mainly [yes] but [0] also
<b>Commissioneers</b>	[-] to [+]	Mainly [+] but [0] also	[-] to [+]	Mainly [0] but [+] also	Equally [yes] and [0]

Table 17 Penalties for the contracting parties - aggregated (derived from Table 16)

- **Penalties in terms of effort**

Further, in the case projects the contracting parties find that there is greater effort in the DBFM change procedure than in non-DBFM due to the involvement of the financiers. However, at least half of the respondents sees no disadvantages in that. Most likely this is because changes are discussed upfront and consequently the procedure takes less effort. This is the case in the N31 and the A12 project. Moreover, in the A12 project the contracting parties do not discuss changes according to the representative of Rijkswaterstaat because "... the contractor has always presented us realistic and fair price estimates...".

- **Penalties in terms of performance**

With respect to performance, i.e. a goal-oriented approach to changes, about half of the respondents was indifferent. It is seen that in principle changes are made for functional purposes: the opposite is not asserted. Further, contract managers usually have the task to perform according to contract, which means not to deviate from it and thus changes are not made for 'playing strategic games'<sup>17</sup>.

### 5.3.3 Proposition III

Thirdly, this thesis assumes:

*There is less contract flexibility for the commissionee than for the client due to the 'watchdog' role the financiers fulfil in the DBFM model.*

From the analysis it is observed that the proposition must be refuted, because the financiers reduce the flexibility for the client as well. Financiers do not promote changes in general.

However, if changes are made, which financiers in principle do not restrict, they focus on the financial compensation by the client that must be sufficient to cover the costs of the contractors. And also, they assess if the SPC incurs a rest risk and if so, this means that the cash flow of the project is at risk. As such, financiers allow for changes, but are focused towards their price.

The belief of this analysis is that it limits the flexibility for the client (too), particularly in terms of costs in respect of proposition II. Further, because of the involvement of the financiers the commissionee has no incentive to make changes. Therefore, **proposition III can be interpreted broader than stated**: financiers restrict the flexibility of both the client and the commissionee. This can be understood as follows. The DBFM contract is the direct agreement between the SPC and the client. As the DBFM model is a tripartite agreement, there is also a direct agreement between the financiers of the SPC and between the financiers and the client.

### 5.3.4 Proposition IV

The last proposition states:

*There is no flexibility of the DBFM contract if change proposals are rejected.*

It was expected from the literature study that flexibility depends on whether changes are rejected. In every project changes are rejected or cancelled and none of the representatives indicated that this reduced the DBFM contract's flexibility. Conclusion: the proposition should be refuted. If changes that are cancelled, withdrawn or rejected give no indication of the degree of flexibility of the DBFM, what then do they indicate?

From the interviews it appears that **changes are rejected on basis of legitimate and/or contractual grounds**. A change can be rejected on whether it generates value for the contracting party that assesses it. For instance, Infrasppeed can reject a change proposal if:

- The change causes an unsafe situation
- The permit (if necessary) is not issued by authorities
- The financing structure of the project is jeopardised

Further, in the A59 project the change from 100 to 130 kph speed limit was not applied at the route "...probably because of environmental and/or noise level reasons..." [commissionee A59]. This change has a political origin and was cancelled by the client itself (Rijkswaterstaat). It is not due to the principles of the DBFM that this change is cancelled, but a reason that could have occurred in every construction project, namely the cost-benefit analysis of the stakeholders.

Finally, the representatives of the Poort van Bunnik explained that it had proposed a number of changes (in the realisation phase) that was rejected by Rijkswaterstaat because it was of the opinion that the activities were in the scope of the Poort van Bunnik. This was thus a matter of risk allocation and negotiation thereupon.

<sup>17</sup> Therewith becomes clear that the job of the interviewee influences its answers.



Figure 19 The widening of the M25 London orbital route (UK) is a £6,2 bio DBFO project (Adam Coupe 2001)

## 6 PFI and DBFO contracts in the United Kingdom

In the United Kingdom the tendency for the private finance initiative (PFI) is declining, because amongst others there is too little flexibility in the model "to accommodate changing public service needs over time" (HM Treasury 2011:4).

Therefore with respect to flexibility of the DBFM contract, it is interesting to learn from experience with DBFO contracts for infrastructure projects in England. The last sub question of the research is:

*What is learned from the experience with flexibility of DBFO contracts for infrastructure projects in the United Kingdom, and how can this experience be used to improve the DBFM approach on Dutch infrastructure projects?*

In order to answer this question a 4-day visit is made to London. Interviews are held with many representatives of EC Harris, one employee of BAM PPP UK and many interviewees from the Highways Agency.

It is concluded that England's first 8 DBFO road contracts were quite inflexible. This is because in those DBFO contracts there is no responsibility that incentivises the contractor to keep maintenance standards up to date. Namely, the risk for change is allocated to the client of those projects. Consequently, the Highways Agency has to conduct long and painful negotiations for each change.

### 6.1 The PFI in the United Kingdom

PFI contracts are directed towards accommodation, i.e. housing projects. Therefore these are discussed only briefly in this section.

#### 6.1.1 What is the PFI?

Private investment in public infrastructure is already a known phenomenon in Europe since the 17<sup>th</sup> century due to fiscal crises in which national governments had difficulties in providing sufficient amounts of capital for public investments. In the United Kingdom entrepreneurs from the private sector were invited to construct national infrastructures. At the same time in France concessions for infrastructures, in which the concessionaire is concerned with the financing, building and operation of a facility for a pre-defined period, the state determined what facilities were required and concessions were only granted to a limited number of companies. (Winch 2006:29,30; Tang, Shen et al. 2010:683,684)

The PFI stands for 'private finance initiative' and originates from pressure on British government resources. In 1992 it was officially launched under the sponsorship of Margaret Thatcher, because her government sought "ways to increase the scope for private financing of capital projects" (House of Commons Treasury Committee 2011a).

#### 6.1.2 The PFI is inflexible

According to the HM Treasury (2011:4) flexibility includes the ability of the contract to "accommodate changing public service needs over time". One of the United Kingdom's leading legal advisers in PFI projects sees that "privately financed projects involve more rigid contract structures than conventionally procured assets resulting in higher procurement costs and **inflexibility during the operational phase** both for major strategic changes and in dealing with small variations" (Dundas and Wilson in House of Commons Treasury Committee 2011b:83).



## 6.2 The Highways Agency's DBFO contracts for infrastructure projects

The Highways Agency administers the DBFO projects in *England* only “as PFI policy is devolved in Scotland, Wales and Northern Ireland” (HM Treasury 2011:4). It is concluded that its first 8 DBFO projects are very inflexible, however, that its 3 recent projects are much more flexible as a result of alterations in the contract.

### 6.2.1 DBFO projects in the United Kingdom

By using a DBFO contract a client assigns a responsibility to a commissionee to operate *and maintain* an infrastructure system. (Highways Agency date unknown) In DBFO, O stands for operate. The ‘M’ of DBFM is included in the O.

In 1996 the first ‘tranche’ of DBFO projects was let by the Highways Agency (see appendix A8.1), which included 8 projects. These projects were procured at the same time, because the British government wanted to find out what ‘works best’. Purposely these road projects have different characteristics; they are located in rural and urban areas for example. Lessons of these projects are carried on and were put into a standardised contract, the SoPC: Standardisation of the PFI Contract. It is said that the government should have procured less than 8 projects at the same time, because now it has made the same ‘mistakes’ on each of the projects.

Further, tranche 2 comprises of two road projects that were let in 2000 and 2002. Tranche 3 encompasses the (internationally) much discussed M25 London orbital route that was let in 2009.

### 6.2.2 Tranche 1 DBFO road projects: inflexibility

Interviewees of the Highways Agency characterise the DBFO projects in tranche 1 as “...**very inflexible...**”. This is due to the fact that in these contracts the DBFO contractor has no incentive to keep up with UK’s maintenance standards. Namely, by signing the DBFO contracts these standards were ‘frozen’: what is written in the contract is the norm. Therefore, the risk for changing circumstances it is assigned to the client: the Highways Agency. As a consequence, interviewees say that they have to negotiate every change. Particularly from the public sector’s point of view the DBFO contract is inflexible, as they are confronted with time and costs overruns, and effort to negotiate a change (remember the definition of Upton (1995)). Lawyers and lenders have to be engaged in the negotiations and it is said that these negotiations are often a “...**long and painful process...**”.

### A1(M) and M40

**Some 100’s of changes** were made in the A1(M) and M40 DBFO motorway projects since the start of the operational phase, in 1998 and 1999. This is due to changing conditions that particularly influence the works. The majority of these changes has financial consequences for the Highways Agency.

It is said that in these (and the other) DBFO projects issues occur when a (part of the) DBFO road is handed over from the DBFO contractor to another contractor, and vice versa. It is an administrative job, which takes time and effort. Therefore, according to respondents ideally the DBFO company carries out the extra works inherent to a change. However, they do not know if this is allowed by European procurement regulation.

### Types of changes

It is concluded that **many changes in the DBFO road projects are policy driven**. These changes originate from changes in the government’s policy, laws and standards, and also from interfaces with other projects such as the construction of a new bypass, which can influence traffic flows. These changes are initiated by the Highways Agency rather than by the contractors.

Further, in general in the first tranche of DBFO projects changes occur gradually. That means, not suddenly. However, interviewees came up with one exception, in which former prime minister Tony Blair has played an important role. He promised replacement of a noisy 8-kilometer section of the A30 DBFO project. In Summer 2000 Mr Blair promised it to the residents of Devon, as the “A30’s concrete surface produces almost twice the noise of an asphalt surface”. Did Mr Blair fully realise the consequences for the DBFO contract? (Hansford 2001)

Finally, the Highways Agency’s department’s representatives recognise the issues with the change procedure in the Netherlands. They have the perception too that (objectively) changes prices are never market conforming, that throughput times are longer than the procedure indicates and that quite some more effort is required to put into effect changing circumstances in DBFO than in non-DBFO.

### 6.2.3 Tranches 2 and 3: improved flexibility

The 3 latter DBFO contracts in tranches 2 and 3 are much more flexible than the contracts of tranche 1. What did the Highways Agency adjust?

A so-called **step change mechanism** was incorporated in the later DBFO contracts. The ‘step’ is a threshold value. Below the threshold the DBFM companies have to adopt current (service) standards on their own account (and therefore have incorporated a risk allowance in their bid price). The Highways Agency pays the change if it has a value above the threshold. Although representatives of the Highways Agency regard this mechanism as major improvement, it is said that the mechanism holds an incentive for the DBFO companies to increase change prices so that their value lies just above the threshold value.

### M25

It is said that in the M25 contract (tranche 3) **the change procedure “...works well...”**. The M25 project is characterised by 15 department’s work changes since it was first opened to traffic, which are changes requested by the department’s nominee for a change at a time prior to the issue of the completion certificate of an upgraded section. Department’s service changes, of which 3 are currently in negotiation, are changes by the client that it can request at any time.

Although most interviewees cannot think of any major change that has occurred in the DBFO road projects, it is observed that in the M25 project the British Minister of Transport made a commitment to convert the hard shoulder of the sections 5 – 7 and 27 – 30 to a regular traffic lane in the beginning of 2012. This was because the National Audit Office judged that hard shoulder running would deliver more value for money than widening would (National Audit Office 2010).

	M25 junctions 16-30 and 5-7
Client	The Highways Agency
Commissionee	Connect Plus
Commencement	May 2009
Available	Spring 2012
Completion	Sections ongoing
Maintenance	30 years (2039)
Contract Value	£6,2 billion (circa €7,3 billion)
Changes	15 department’s work changes
	3 department’s service changes in negotiation

Table 18 M25 DBFO tranche 3 Highways Agency



### 6.3 Reform of the PFI in the United Kingdom: PF2

“... **PFI stands for ‘pay for it indefinitely’...**” said one of the interviewees in London. Several respondents feel that the model is a mortgage. However, the PFI should deliver cost effective investments and must ensure “that the taxpayer is getting maximum value for money”. However, there are strong concerns, illustrated by the DBFO projects of the Highways Agency, that the PFI is too costly, too opaque and too inflexible. To improve the transparency and cost effectiveness of PFI the British government is currently reforming the PFI model to the so-called PF2 model. PFI has been used to deliver about 700 facilities in the entire United Kingdom. (HM Treasury 2011:3)

#### Future DBFO projects (and changes) for the Highways Agency

It is heard that the Highways Agency is spending 50% of its total budget on the DBFO projects, which encompasses only 17% of the road network it manages. Nowadays many changes originate from the United Kingdom's national budget savings. As a result, the Highways Agency searches to change, i.e. to downgrade the service regime of the projects.

Currently there are no private finance projects ‘in the pipeline’ for the Highways Agency as there are no future projects that would suit the DBFO model.

### 6.4 A note on the institutional framework

According to Spencer and Gómez (2003) each country has its own institutional environment and profile, that comprises of “relatively stable rules, social norms and cognitive structures that guide [and] constrain (...) domestic economic activity”. This institutional framework consists of three pillars: the normative, the cognitive and the regulatory framework. It is important to have an understanding of the institutional framework of the Netherlands and the United Kingdom for knowing how Rijkswaterstaat can learn from the English practice (and vice versa).

According to Steers, Sanchez-Runde et al. (2011:384) the regulatory framework comprises of laws, rules, regulations and public policies that define what is ‘legally’ correct in a country. In the United Kingdom, contracts are based on the **Anglo-Saxon model**, in which a free market economy is advocated. The state is reticent to regulate society, contrary to the **Rhineland model** on which the Dutch contracts are based. Consequently, the British contracts are very extensive, whereas Dutch contracts rely more on reasonableness and fairness. As “not everything can always be described in detail” and as things can be self-evident these are not laid down (Boot, Bruggeman et al. 2008:3). Further, in England it is said that in principle they have more adversarial relationships than in the Netherlands, which forms a part of the normative pillar.



Figure 20 Afsluitdijk Stevinssluisen Den Oever (NL)  
(Peter Struik via RWS Beeldbank 1991)

## 7 Conclusions

Because due to little experience with DBFM contracts in the Netherlands, it is (was) unknown how the DBFM contract can accommodate changing circumstances by means of the change procedure. Therefore the research objective of this MSc thesis is to fill in the 'knowledge gap' that exists for flexibility of DBFM contracts and to make recommendations for improving the DBFM approach on Dutch infrastructure projects. The recommendations are presented in section 7.6.

In order to reach the research objective a central research question and 4 four sub questions were established, which are answered in sections 7.1 – 7.5.

### 7.1 Theoretical background

Sub question 1 of this research is:

*What is meant with flexibility of the DBFM contract?*

From the literature study is observed that the DBFM contract can anticipate changes through the **change procedure** (Hamdan, Van Baekel et al. 2011). That procedure is necessary because it specifies "what to do in certain future states or at least which party has the right to act upon the fact that a certain future state materialises (Krüger 2012:1361). Through the DBFM change procedure both physical changes in the asset and changes in the contract mechanisms can be proposed by either the client or the commissionee of the DBFM contract. For the contracting parties the change procedure is a means to put into effect changing and/or changed circumstances.

Whereas the above description of flexibility is quite unequivocal, the explanation of what flexibility is as a *concept* requires imaginative power. Namely De Haan, Kwakkel et al. (2011:924) suggest that "whatever is flexible can undergo change without changing itself". From that viewpoint a flexible DBFM contract should thus be prepared for a change by means of options in the contract. This means that the contract can be employed differently and that flexibility is an 'engineering task' as it must be designed for purposely.

More specific and quantified is the often-cited definition of Upton (1995), who proposes that flexibility is the **"ability to change or react [to changing circumstances] with little penalty in time, effort, cost or performance"**. In this research the definition was applied to the change procedure of the DBFM contract. That means that it is assumed that the DBFM contract is flexible, if there is little or less than little penalty in respect of time, costs, effort or performance in the changes through the change procedure for the contracting parties.

Whether this analytical framework is true, is tested in 4 Dutch transportation infrastructure case projects, as can be seen in the following section(s).

### 7.2 Changes and flexibility in 4 Dutch transportation infrastructure case projects

Then, sub question 2 of the thesis is:

*What types of changes are made in practice in the longer term in infrastructure projects in the Netherlands (7.2.1) and, according to the contracting parties, do those changes provide for flexibility of the DBFM contract (7.2.2)?*

Four DBFM infrastructure projects have served as case studies in this research in order to answer sub question 2 (and partly sub question 3). Those projects comprise of 3 road projects, namely the A59 and A12 motorways and the N31 highway, and a rail project, the HSL-Zuid.

These cases have unique, but also similar characteristics, namely: the asset is part of the Dutch national transportation network, there is a public client and realisation of these projects is completed and thus the infrastructure can be fully utilised.

#### 7.2.1 The types of changes in the 4 case projects

The changes in the case projects can be divided into a number of categories, namely into change by *origin, value, impact and type*.

From the case studies and the results is observed that:

- **Number: more changes in rail than road projects**  
Relatively, the number of changes in the HSL-Zuid project is far higher than in the road projects, which is due to the technical complexity of the HSL-Zuid project.
- **Origin: changes mostly have an external cause**  
The origin of the changes is largely external, because of requests from third parties or changes in law. However, often the risk for 'external' changes is allocated to the client. Therefore the case projects are characterised by more changes initiated by the client than commissionee.
- **Value: more changes above than below the threshold value**  
The majority of the changes has a value above the threshold, which discerns 'small' value changes from 'other' changes. However, 'other' changes are not directly 'major' changes.
- **Impact: changes have an impact on the works and services**  
To a large extent the changes have an impact on the works and services; only two changes had a financial impact on the project solely, as they did not change the works or services.
- **Type: changes mostly have a functional purpose**  
The majority of the changes alters and/or optimises the use or functionality of the asset.

From literature was understood that the number of changes is an indicator of the flexibility in the DBFM contract. However, this research concludes that this is not true; the quantity is an indicator of the dynamics of the project's context. Namely, the more dynamic the context, due to for example politics and stakeholders, the more changes. Therefore, **the degree of flexibility cannot be 'measured' by the number of changes**; rather it says something about the **flexibility that is necessary**.

#### 7.2.2 There is flexibility, according to the contracting parties

In the case study research the interviewees, which are representatives of the client and the commissionee of the DBFM projects, were asked whether they were of the opinion that there were disadvantages in the change procedure in one or more of the aspects of time, costs, effort or performance, see the definition of Upton (1995). It was observed that **in each of the aspects except for performance the interviewees are of the opinion that there is a penalty**.

- **Time and costs 'overruns' of the DBFM change procedure**  
The data shows that in each of the case projects it takes *longer than necessary* to process a change through the procedure. In theory the procedure can be passed through in about six weeks.

Further, with respect to the costs of changes, it is observed that change prices are high due to the involvement of the financiers and because each party hires advisors. Therefore there is a 'pain' in terms of costs, due to **the DBFM 'circus' that increases transaction costs**. However, none of the interviewees was of the opinion that direct costs were (too) high. These direct costs vary with the volume of a change.

- **Much 'effort' required for the change procedure whereas performance is no issue**

Further, due to the extensive DBFM 'circus' representatives of the clients as well as of the commissionees in the case projects indicated that there is a penalty in effort. Interviewees noted that the change procedure is an 'administrative burden' and to reduce it, changes are processed together at once.

On the other hand, in the case project in performance there is no disadvantage due to the fact that changes are initiated for means of functionality. This means, changes are not (directly) used to play 'strategic games', i.e. are purposeful, most likely because the penalty in the other three aspects is too high to do so.

To conclude, in this research is observed that there is a penalty in time, costs and effort in terms of the definition of Upton (1995). However, **according to the contracting parties the change procedure provides for flexibility**. That is, the interviewees are satisfied with the fact that they can put changing circumstances into effect by means of the change procedure.

However, it must be noted that the negative consequences in terms of time, costs and effort, are only relative, because it was seen that the majority of the respondents was of the opinion that the consequences were marginal.

### 7.3 Interests of contracting parties and financiers in changes and flexibility

Thirdly, sub question 3:

*How do the interests of the DBFM contracting parties and the financiers play a role in the change procedure and therewith in the flexibility of the DBFM contract?*

In theory was observed that both contracting parties can propose for changes. However, in practice changes are rarely proposed by the commissionee in the exploitation phase of the case projects. The commissionee is focused towards the availability of the infrastructure: in the exploitation phase it has a system that functions optimally – without changes. Further, **the commissionee's and the financiers are focused on making as few changes as possible**, because changes can be a risk for the availability fee and thus the cash flow of the project from which the debt equity plus interest has to be paid by the SPC to the financiers. The contracting parties' and the financiers' interests in changes therewith partly overlap.

**The involvement and the interests of the financiers have a bearing on the behaviour of the contracting parties in general.** That is because financiers focus on a stable cash flow of the DBFM project, which is generated by the fee that the commissionee receives if the infrastructure asset is available for use. Financiers are particularly interested in the payment they receive from the SPC, because in turn financiers have financial agreements with other investors which they have to honour. In that respect one could say that they have the same interests as the commissionee: make sure that income is generated.

Due to the involvement of the financiers **the commissionee is focused on securing the DBFM project's cash flow**. Namely, from the net availability fee it receives the special purpose company (SPC) has to deduct the project's operational costs and further has to pay the financiers the debt plus interest. But the SPC has passed on this risk to the DBFM contractors by means of back-to-back contracts, i.e. many of the responsibilities of the SPC are to be seen

as the responsibility of the EPC and the MTC contractors. Therefore, the contractors are focused on meeting the milestones and service specifications of the DBFM contract. And so the contractors as well as the financiers want to be sure that a change does not influence the performance of the asset, and if it does so the contractors are likely to negotiate for reduced performance guarantees. Moreover, DBFM contractors reason that if they have been issued the completion certificate, they have a 'functioning system' that meets the output specifications and therefore they do not favour changes; "...only if the client desires this...".

Finally, it was seen that the **client** is the commissioning party that faces the financial consequences of the changes. Therefore, in principle it is focused on making as few changes as possible. However, it has the responsibility to represent society's need and demands, and so has the difficulty of 'wearing two hats'. In the contracts, often the risk for changes has been allocated to the client.

### 7.4 DBFO in England (UK)

Sub question 4 questions:

*What is learned from the experience with flexibility of DBFO contracts for infrastructure projects in the United Kingdom, and how can this experience be used to improve the DBFM approach on Dutch infrastructure projects?*

On the basis of interviews with representatives of the Highways Agency, EC Harris and BAM PPP UK in London and on basis of British government reports, this research concludes that **DBFO contracts in England and DBFM contracts in the Netherlands** for road projects are about **equally flexible**.

However, the Highways Agency's first 8 DBFO road contracts were quite inflexible, particularly compared to the Dutch case projects of this research. In those DBFO contracts, in which the contractor has a greater responsibility because it has to operate the road too, the DBFO company is not obliged, i.e. there is no incentive that triggers the contractor to keep maintenance standards up to date. Namely, because the risk for such changes is allocated to the Highways Agency, as a client. However, in later DBFO contracts, such as the £6.2 billion M25 London orbital route project, the Highways Agency has included more flexibility in the change procedure by means of a different risk allocation. In turn, the main lesson for Rijkswaterstaat is to engineer an allocation of risks in which the contracting parties are responsible to mitigate the risk they can manage best.

Further, **in England the issues with flexibility in the transportation infrastructure sector are similar to those in the Netherlands** with respect to time, costs and effort. However, in England there is a declining interest for the private finance initiative (PFI) whereas in the Netherlands the government promotes DBFM. Now it must be said that in England, the PFI is much more geared towards housing projects, in which flexibility seems to be more urgent as such type of projects are more dynamic: housing projects are easier subject to changes in scope, organisation etc.

### 7.5 Answer to the central research question

The central question of the research is:

*What flexibility is offered by the change procedure in the DBFM contract for Dutch transportation infrastructure projects and how do the interests of the contracting parties and the financiers of the DBFM contract play a role therein?*

The conclusion to this question is that the change procedure provides the flexibility **to put into effect minor changes** in the DBFM contract, at least in the case projects. However, in those 4



case projects no major changes occurred. And because in England there is only little experience with major changes too, from this research it is yet unknown how the DBFM contract can put those into effect. See section 7.5.1.

Moreover, in this research is observed that flexibility is a rather 'non-distinct' ability of the DBFM contract and therefore cannot be regarded from one viewpoint or perspective only. This is explained in section 7.5.2. Besides the change procedure, **two other dimensions are discerned** in this research, which allow for a certain degree of flexibility of the DBFM contract, see Figure 21.

#### 7.5.1 For minor changes the DBFM contract is flexible; for major changes yet unknown

In the 4 DBFM case projects of this research (3 road projects and a rail project) is observed that for minor changes, such as constructing an extra road sign, the change procedure offers the possibility for the DBFM contract to accommodate these. However, no major changes were concluded in the case projects and so from Dutch practice it is unknown what flexibility is offered by the change procedure in the DBFM contract.

What about the minor changes? In the case projects each, except for one, of the changes submitted by the contracting parties were accepted. The majority of those changes is characterised by very few consequences, thus these are (very) minor changes. By means of the change procedure the contracting parties could and did process these changes. Therefore it is concluded that there is flexibility when it concerns minor changes.

However, due to the fact that **no real major changes** were concluded in the case projects, it is unknown from Dutch transportation infrastructure practice how the change procedure can effect those. Only in the HSL-Zuid and the A12 DBFM projects were relatively large value changes brought about. For confidentiality reasons these values cannot be included in this thesis, but it can be said that these do comply with European procurement legislation, in which it is allowed to assign the works inherent to a change to the DBFM contractor(s) if the value thereof does not exceed 50% of the original assignment (see Hebly and Heijnsbroek 2012 in appendix XXX).

#### 7.5.2 Flexibility is observed in several dimensions

In the analytical framework was observed already that 'flexibility' is a concept and therefore very ambiguous. For flexibility a definition was presented, which 'quantifies' it: flexibility is **the "ability to change or react [to changing circumstances] with little penalty in time, effort, cost or performance"** (Upton 1995).

From the viewpoint of this definition the research concludes that the change procedure does not provide for flexibility of the DBFM contract. That is because there were 'penalties' in each of the 4 aspects of the definition, particularly disadvantages were seen in the aspects of time, costs and effort of processing a change through the change procedure of the DBFM contract. These disadvantages occurred in each of the case projects, moreover, for both the client and the commissionee of those projects.

However, **the definition is too narrow**. It is very precise, it does not allow room for broader interpretation in terms of flexibility of the DBFM contract and therefore cannot be used as a 'standalone definition' with respect to DBFM contracts. This was observed when the study came across the following contradiction: although the DBFM case projects in this study are characterised by one or more penalties as described above, the interviewees of the contracting parties were of the opinion that the DBFM contract was flexible. Therefore, there is a general belief that the definition is based on only one dimension of flexibility of the DBFM contract. Namely, it only 'measures' the flexibility by means of the change procedure.

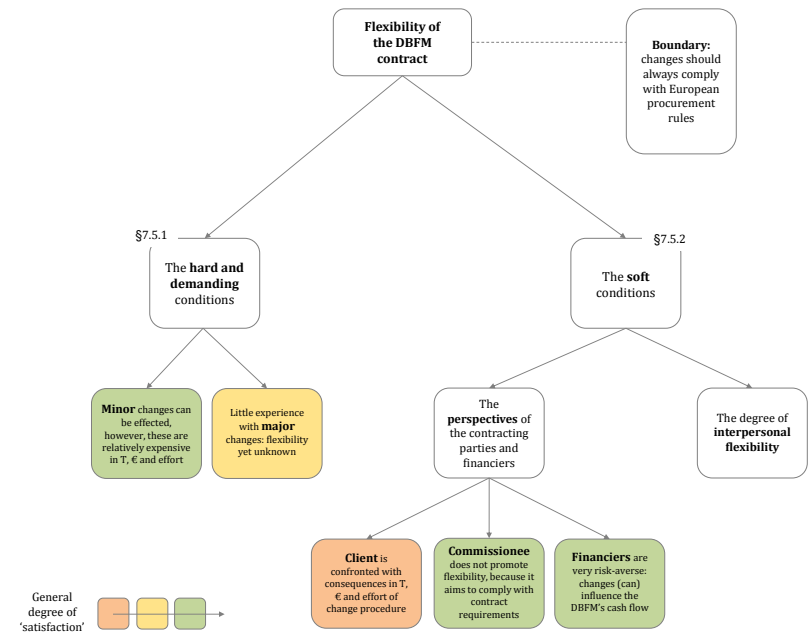


Figure 21 The flexibility of the DBFM contract depends on several dimensions

See Figure 21. In the research is observed that **flexibility relies on several other dimensions** too, which include:

- **Flexibility of the DBFM contract depends on interpersonal flexibility**

In the first instance, flexibility is determined by the demanding conditions, i.e. the stipulations in the DBFM contract, such as the change procedure.

However, from the interviews it became (very) clear that the **'soft' arrangements** are equally important. Namely, whether the DBFM contract allows for changes, depends on whether the (representatives of the) contracting parties collaborate constructively. It is observed that if they do so, **the parties' willingness** to put changing circumstances into effect is greater: the representatives are more likely to grant concessions. And so the flexibility of the DBFM contract depends on the degree of interpersonal flexibility of the parties' employees.

The interpersonal relationships, for instance between contract managers of the contracting parties, are strengthened by trust and understanding of the other party's interests. In turn, the flexibility the representatives are likely to express, depends on the room to manoeuvre their organisations (can) give them.

The above can be illustrated as follows. In each of the case projects the procedure is found to be slow, which means that throughput times are not met. However, this is where the behaviour of the contracting parties comes in: it was not the procedure being slow, but the throughput times were dependent on how fast the representatives of the contracting parties could and wanted to (re)act on the steps in the change procedure.



- **Take into account the contracting parties' perspective in flexibility**

Secondly, whether there is flexibility of the DBFM contract is dependent on whose perspective is taken: the client's, the commissionee's or the financiers' viewpoint.

In the 4 case studies is observed that it takes time, (transaction) costs and effort to put changing circumstances into effect by means of the change procedure. The negative consequences of changes, which is the disadvantage in time, costs and effort, is usually borne by the client of the DBFM project. Therefore, **'inflexibility' is particularly a 'problem' for the client.**

To a large extent those perspectives to flexibility are determined by the interests of the parties. **In principle neither the client, nor the contractors or the SPC, and the financiers, advocate changes.** However, it was observed that their interests can differ as well. This was described in section 7.3.

## 7.6 Recommendations for the DBFM approach

From the conclusions in the previous section, which discerns for soft and hard dimensions of flexibility, recommendations are derived to improve the approach to DBFM contracts. Making recommendations is the objective of this research.

### 7.6.1 Focus on (interpersonal) collaboration instead of the change procedure

In the case projects of this research it is observed that **the change procedure was only a formalisation process of issues that are discussed before they enter the procedure.** This implies that the change procedure is only a juridical measure, which the parties consult when they disagree in an informal setting. Moreover, it was concluded in section 7.5 that to a large extent the flexibility of the DBFM contract is based on whether the parties' representatives are willing to grant concessions.

As a result, this thesis recommends the contracting parties' representatives to focus on creating and maintaining an effective, constructive interpersonal relationship. Namely, the case projects in which the relationship is praised, are most successful. In February 2013, the A12 DBFM project was awarded the *Nederlandse Bouwpluim* for amongst other things 'mutual flexibility' and focus on 'operational-decision making' and was completed several months earlier than was estimated. Further, the interviewees of the A59 DBFM project repeatedly told that "...the P of Partnership in PPP is very successful in this project...".

There are 5 stages in which the parties' representatives should be aware of the human factor in the construction sector:

- **In the competitive dialogue (1)**

For the contracting parties the emphasis in the competitive dialogue, which is the procurement procedure for awarding a DBFM contract, is on the agreement on the DBFM contract. However, at this point the parties should discuss each other's interests and **identify changes already.** Besides, the focus should be on 'getting to know' each other, including the financiers or their technical advisors.

- **In the transit from selection to realisation & from realisation to exploitation (2,3)**

Make sure key players, such as project and contract managers, stay with the project. Particularly in these transition phases key players, such as tender managers in the dialogue phase or project managers in the realisation phase, change. Maybe it is wise for the financiers for example to have only one technical advisor?

- **In the realisation phase & the exploitation phase (4,5)**

It was observed that often the contract is used as a means to solve conflicts. However, it is advisable that contracting parties' employees put effort in their relationship in 'times of peace' too. For instance, the SPC can invite the financiers to come and took a look at the project.

### 7.6.2 The parties should increase their understanding of each other's perspectives

In chapter 1, which is the introduction of this thesis, was observed that there is a knowledge gap for flexibility of DBFM contracts due to the fact that there is only little experience with it in the Netherlands. However, in section 7.5.2 is concluded that flexibility also relies on whose parties' viewpoint is taken in flexibility. Therefore, there is a general belief that the knowledge gap can be decreased when the contracting parties realise that flexibility for the one does not have to imply flexibility for the other.

It is the joint task of the construction sector to improve the understanding of practitioners of DBFM. Rijkswaterstaat's *DBFM Netwerksimulatie*, which is a game in which the DBFM's long term is simulated from the viewpoint of the client and the commissionee, can for instance contribute to that.

### 7.6.3 Draw scenarios for major changes

Real major changes have not occurred yet in the DBFM transportation infrastructure sector in the Netherlands. However, whereas the contracting parties are of the opinion that these changes are likely to occur, they do not know yet how to put these into effect in the DBFM contract.

In this research was observed that there is a solution space to major changes already. It is preferable that the contracting parties (jointly) draw scenarios, based on this solution space, in order to be able to react to major changes accurately and effectively when these are brought about in DBFM projects.

In arbitrary order, **the solutions to major changes** are:

1. **Adjust the scope of the DBFM project (temporarily)**

It was seen that in some of the case projects, as a solution to a change, the scope of the DBFM project was (temporarily) adjusted. In particular this solution was applied in the case of a new interface with another (non-DBFM) project. This interface is a risk for the DBFM contractor, because it is responsible for the availability of the infrastructure. When the scope is adjusted, the contractor of the other project temporarily becomes responsible for the DBFM asset.

Besides, the scope can be adjusted permanently too, such as in the A12 Lunetten – Veenendaal project. The works inherent to the fly-over were distributed between the Poort van Bunnik and the contractor of the project from which the change originated, so that the Poort van Bunnik, the DBFM contractor, could construct a part of the driveway<sup>18</sup> in order to secure the interface between the driveway and the A12.

2. **Or reduce the commissionee's availability guarantee**

In the previous solution the works inherent to a change are partly assigned to the DBFM contractor. However, alternatively the client can decide to reduce the availability the commissionee has to guarantee, i.e. the commissionee's promise to perform according to the contract. Although in the interviews this was discussed as being a feasible

<sup>18</sup> Dutch: toerit.

solution to the commissionee, the client must realise that this can reduce the quality of the asset.

### 3. Do a periodic review of the DBFM contract

PFI contracts in the United Kingdom can allow for periodic reviews: specified breakpoints in the contract, at which the contract's terms can or have to be renegotiated (for example every 5 years). In the United Kingdom this procedure can be used both for accommodation and infrastructure projects, but is especially introduced for "reviews of service provisions" thus housing contracts (HM Treasury 2012b:13).

The review is a discussion process between the client and the commissionee, in which the commissionee is assessed on key performance indicators (KPI's). These KPI's can include the availability of the asset and the asset's capacity in case of toll roads or rail projects. If a change occurs *in between* two breakpoints, either a claim (dispute) is set or a variation order is requested.

At the same time this solution is characterised by a disadvantage, Namely, according to the HM Treasury (2012b:92) those breakpoints "can discourage a long term approach to whole life costing and make long term interest rate swaps less appropriate". Therefore, the parties should specify at the outset of the what can be negotiated and how this should be discussed.

The above 3 suggestions can provide for solutions to (major) changes. However, in the analytical framework it was observed that De Haan, Kwakkel et al. (2011:924) suggest that "whatever is flexible can undergo change without changing itself". In the solutions above the contract's (basic) terms are adjusted, such as reducing the height of the availability the commissionee has to guarantee. Further, as a solution the HM Treasury (2012a) suggests to include early termination rights in the contract, and the possibility for reduction and removal of services from the contract. **These solutions imply that the DBFM contract is inflexible**, as the contract cannot undergo a change without being changes itself.

#### 7.6.4 Don't apply DBFM if scope is unclear or if causes of changes cannot be mitigated

Fourthly, it was seen that the majority of the changes in the exploitation phase of the case projects is characterised by an external origin, which lies beyond the control of the contracting parties. Therefore, the general belief is that DBFM contracts can be applied best to projects that are characterised by a 'stable' environment, i.e. are likely to suffer little from such external forces. However, Rijkswaterstaat has the wish to apply DBFM contracts to complex, dynamic projects so that the DBFM contractor can optimise it.

Therefore, several situations are discerned to make a recommendation towards the DBFM approach, see Figure 22. It specifies in which situations DBFM is best applicable. There are 2 scenarios in which it is advisable that the DBFM contract is not applied, which is **when the causes of major changes cannot be mitigated**. This is because it is seen that there are major disadvantages in processing such changes; the M25 change from widening to hard shoulder running took the contract managers of the Highways Agency about 9 months to go through the contract only to see if this was possible.

Besides, DBFM should not be applied **when the scope is unsure**. In the case projects there is one example that makes clear that Rijkswaterstaat is aware of that. Namely, in the A12 Lunetten – Veenendaal motorway project it discussed with the Province of Utrecht to include the fly-over in the DBFM scope.

Despite the above, of course DBFM can be applied in those situations. However, it is expected that the contract does not deliver the value for money it aims for. Sure the commissionee carries

out the change if the client desires this – on the condition of a payment of compensation<sup>19</sup> - but the client has to have time, money and effort (labour) available.

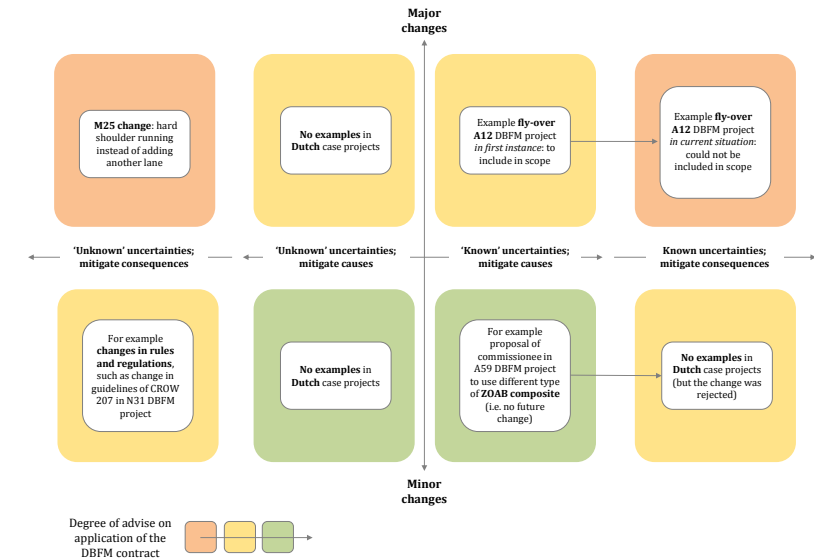


Figure 22 Types of changes versus types of uncertainties

#### 7.6.5 Engineer flexibility at the outset of the project

When flexibility is engineered in the procurement phase of the competitive dialogue, in other words, when it is engineered in the contract or the project in another way than the change procedure, it is likely that less changes have to be made through the change procedure. As it was observed in the transportation infrastructure case projects that changes in the exploitation phase require time, money and effort, this is a method to reduce those disadvantages.

#### 7.6.6 Track and assess changes in current and future DBFM projects

Further, the main idea of DBFM is to create value for money. As it is observed that changes demand the client to spend extra money, it is important for clients such as Rijkswaterstaat to assess the decrease in the added value of utilising DBFM contracts. Thereto it is important to keep track of and assess changes in the future. This in order to build a pattern of changes, up and until a contract's end date *and thereafter*. This is also recommended by the United Kingdom's Economics and Finance Ministry: for public clients to collect data to build a pattern of the changes, in each sector.

#### 7.6.7 Include a change budget: the project's context is per definition dynamic

By knowing what types and how many changes are likely to occur, following the previous recommendations towards the DBFM approach, the contracting parties can have an increased insight in the budget(s) they should reserve for changes.

Particularly in economic turbulent times, such as with the current financial crisis, tender prices are very tight and so there is less room to make changes within the original budget.

<sup>19</sup> Dutch: geval van vergoeding.

Consequently, the parties have to rely on change budgets, which the parties should recognise in the competitive dialogue, in which they can identify for changes already.

#### 7.6.8 Improve the change 'procedure'

At last, it was observed that in none of the case projects the interviewees directly expressed their dissatisfaction towards the change procedure. Therefore there is a general belief that the change procedure is sufficient for putting changing circumstances into effect. However, some observations were made that can improve the procedure.

In the N31 highway project representatives of both Rijkswaterstaat and the Bouwcombinatie Wâldwei were of the opinion that the change procedure is an 'administrative burden'. Thereto they decided to bundle a number of minor changes. In general, "...the difficulty with the procedure is that several parties have a saying in it, which makes the process more complex..."

In the HSL-Zuid project the interviewees noted some points at which the project's change procedure can be improved, namely:

- The commissionee's internal process is extensive due to the involvement of the financiers and due to the fact that, according to the client, it has few employees available to pick up the assignments inherent to a change.
- There is no incentive for the commissionee to react to State Variation Proposals, so as a consequence the client is dependent on the interpersonal relationship.
- Further, the contracting parties disagree on how the procedure should be processed: the client requires a price estimation at the outset, whereas the commissionee is only obliged to provide at together with the Variation Impact Report. This is when the global agent has given its consent to the change. See appendix A5.2 for the HSL-Zuid DBFM project's change procedure.

The general belief is that the change procedure is SMART<sup>20</sup> (enough). Although in some cases there are some minor issues, it is seen that the change procedure is in fact a 'robust' process. Besides, the change procedure is only a formalisation process.

<sup>20</sup> Specific, measurable, attainable, relevant and time-bound.



Figure 23 DBFM project Kromhout Kazerne in Utrecht (NL): a modern workspace for the Dutch Defense (Jannes Linders date unknown)

## 8 Discussion & recommendations for further research

In research, results can be understood from different perspectives. Therefore the data that was gathered in this thesis is put into perspective in this chapter. Subsequently, section 8.2 proposes for recommendations for future research projects.

### 8.1 Discussion of the research methodology and results

Ghuri and Grønhaug (2005:225) note that “we [researchers] should give an account of our method’s strengths and weaknesses”. This is done in section 8.1.1. Further, unexpected or ‘drastic’ results are discussed. Some of these can also be interpreted differently, as can be seen in section 8.1.2.

#### 8.1.1 The research method’s strengths and weaknesses

A researcher should always give account of the study’s validity and reliability, and therefore, this section goes into this research’ methods strengths and weaknesses.

- **The research isolates the discussion whether flexibility is ‘good’ or ‘bad’**

Because it would imply a subjective assessment, this research has been isolating the discussion of whether flexibility is ‘good’ or ‘bad’. Instead, the focus of this thesis was on investigating by ‘what’ flexibility the DBFM contract is characterised.

Nevertheless, this research discusses whether flexibility is useful and for whom that is so, because it took into account the interests of the contracting parties and the financiers of the DBFM contract.

- **The research relies on 4 cases only**

Further, due to the fact that DBFM contracts are applied recently in the Netherlands, this research is characterised by an explorative form. Currently only 4 DBFM projects in the Dutch transportation infrastructure sector have been issued the completion certificate. Already at the outset of this study was observed that this is only a small number of projects to draw conclusions from. Therefore, particularly it is not fully valid to generalise the results of this study to other sectors such as the housing sector (although there are implications that the dimensions of flexibility as outlined in chapter 7 are true for DBFMO housing projects). Further, only few changes were made in the case projects, which formed an extra challenge in drawing conclusions.

- **In case study research, the results are dependent on interviews**

In section 3.1.3 was already noted that the results of case study research are dependent on the skills of the researcher. By doing test interviews the research tried to neutralise the effects thereof. However, the interpretation of the data, particularly because it is qualitative, is dependent on one perspective only: that of the researcher.

#### 8.1.2 Unexpected and/or special results

From the literature study in chapter 2 four propositions were drawn. This section explains the unexpected and/or special results that lead to the fact that each of the propositions was refuted.

- **The context variables of this qualitative research**

In qualitative research, the object of study (flexibility of the DBFM contract) is observed in its common and ‘own’ situation. This is the object’s context. Doing case studies is a research methodology that takes into account the cases’ context. (Baarda, De Goede et al. 1998:89).

The advantages of this holistic approach is that usually the data is ‘richer’. Contrary, **the DBFM project’s context can influence the results**, both positively as negatively. In this research is observed that such context variables influence the analysis of the results, which consequently can be interpreted differently.

- **The DBFM contract’s institutional framework**

Each country has its own institutional profile that “sets the framework for market transactions by defining the alternative courses of action open to firms” (Spencer and Gómez 2003:1099). Therefore, whether there is flexibility, can be influenced by the institutional framework of DBFM contracts.

One of the three piles in the institutional profile is the **regulatory dimension**, which “consists of laws, regulations and government policies” (2003:1100). In this research is seen that the A12 DBFM project is part of the programme *Spoedaanpak Wegen*, which is a temporary legal framework that is characterised by simplified procedures. Such measures can increase the flexibility, because there is governmental pressure to realise 30 busy junctions that are part of the *Spoedaanpak*.

Further, flexibility can also be determined by **economic factors**, because this can influence the budget the contracting parties have and thus whether they have ‘room to negotiate’. For instance, now the Dutch government has to cut on its budget, flexibility decreases as it has less room to manoeuvre, i.e. to negotiate.

- **Ambiguity of the contract**

Contracts are per definition incomplete (Zheng, Roehrich et al. 2008; Krüger 2012) and this study understands that this can be both an advantage and a disadvantage.

On the one hand **ambiguous contracts can provide for more flexibility**, because there is more ‘room’ in the DBFM contract with which changing circumstances can be put into effect without following formal procedures. However, it can also imply that **the contract is not ‘good’ enough**. As a consequence the contracting parties can have a different interpretation of the contract’s clauses. For instance, in the HSL-Zuid project the interviewees mentioned that the change procedure was doubted and negotiated upon after the contract was signed as the contracting parties held a different interpretation.

- **Relational contracting**

Relational contracting is a contracting mechanism in which mutual trust and cooperation, i.e. close collaboration, aims at realising “a complex construction project or long term development programs” (Colledge 2005:30). Already in the literature study in chapter 2 was observed that the contract is a means to govern a relationship between parties. Relational contracting is one way to do so.

The mechanism of relational contracting can be applied as a standalone, or in combination with a strong legal framework, however is “based upon social processes, like trust, that promote *norms of flexibility*, solidarity and information exchange” (Zheng, Roehrich et al. 2008:44). The degree of relational contracting is a dimension that influences the degree of flexibility of DBFM contracts. See also appendix A2.16.



- **It was not expected that in the case projects only few changes are withdrawn**

A priori was expected that changes withdrawn or rejected by the contracting parties indicate a degree of DBFM contract flexibility, see proposition IV in the analytical framework as presented in chapter 2. However (surprisingly) significantly few changes were rejected or withdrawn. If they were so, this was on contractual grounds and/or well-founded arguments, such as that the cost-benefit ratio of a change is too high. Therefore in chapter 7 is argued that this is due to the fact that the change procedure is flexible.

However, this can be subject for discussion, as was observed that the change procedure is only a formalisation process. In phase 2<sup>a</sup> this research focused on the change procedure only, not on negotiations about issues before these enter the procedure. This can distort the results of this research. What is more important, is that is expected that much is discussed outside the change procedure that can generate an insight in the change procedure.

- **Particularly only minor changes in the case projects**

Finally, a priori was expected that this study would come across many and/or major changes. The contrary was true: only few changes are concluded in the exploitation phase of the case projects, which are characterised by a small value.

Why were particularly minor changes concluded in the case projects? This is either because there was no need to put into effect other changing and/or changed circumstances, or because DBFM holds an incentive for the contracting parties not to propose for changes, namely, because changes require time, money and effort, both by the client and the commissionee. This thesis assumes the former, because the latter cannot be concluded on basis of the evidence of this research.

## 8.2 Recommendations for further research

Often a research project has a limited scope and so this MSc thesis has. Nevertheless, there remain assignments that are interesting and valuable to look into. The **following problem statements are worth studying**.

- **The definition of flexibility is not widely supported**

This research relied on a particular definition of flexibility, which has not been tested on its validity in relation to DBFM contracts. As mentioned, many practitioners have their own idea about flexibility of the DBFM contract, due to the fact that flexibility has many dimensions. Therefore the definition of flexibility must be established in order to prevent a confusion of tongues, which is not effective and efficient.

- **Transaction costs of changes are unknown**

This research had a holistic approach to the costs of changes, i.e. the transaction costs and the direct costs were not investigated separately, see appendix A4.2.2. However, negotiations and issues with respect to the change procedure often occur in terms of market conformity of the changes that is related to the transaction costs. Therefore this is worth studying in detail, which can only be done in close cooperation with the contractors as these have direct and complete insight in the components of the change price.

- **Types of financiers have different types of interests in flexibility**

Thirdly, in this research the interests of the financiers were studied, however, 'only' three persons were interviewed. These spoke on behalf of a SPC, a financial advisor and an investor for pension funds. Together these respondents provided for a 'glimpse'

of the financiers' 'aggregate' interests. However, it is worth studying how the different types of financiers, namely commercial banks, non-profit banks such as the European Investment Bank, and institutional and industrial investors, assess changes and therewith flexibility. This gives a better understanding of their interests.

- **The change procedure is one option for flexibility: there are other possibilities**

The change procedure in the DBFM contract is just one method to provide for flexibility of the contractual agreement. However, in the analytical framework was already observed that there are other possibilities, such as incorporating flexibility as a criterion in the procurement stage, to put changing circumstances into effect. As this research concluded that the change procedure requires (too much) time, money and effort, it is suggested to look into such other options that provide for flexibility of the DBFM contract. What is the most efficient and/or effective way for incorporating it? See appendix A3 for the conceptual model that can help getting an insight therein.

- **Costs of flexibility: the relation between DBFM contract flexibility and risks**

From this research is concluded that flexibility of the (DBFM) contract and risks are closely related. Therefore it is interesting to know better how these aspects of 'construction management' relate in practice. What does flexibility cost, particularly when it is 'engineered' at the outset of the contract?

- **A different pattern of changes in accommodation projects?**

This research presents a pattern of changes in Dutch and English transportation infrastructure projects. In addition to the original research plan, two interviews were held with representatives of commissionees of accommodation projects, namely the *UCL Academy and Swiss Cottage* education project in London (England) and the *Kromhout Kazeme* defense project in Utrecht (Netherlands).

It is observed that the end user in accommodation projects has a different role than road users have. Namely, teachers and school children use the asset much more actively than car drivers do. However, these two interviews only give an indication of the difference between infrastructure and housing. Therefore this thesis recommends to build a pattern of changes in accommodation (schools, hospitals, and prisons etc.) in the same way this research has done. How does the type of changes compare to infrastructure and how do the DBFMO contracts provide for flexibility through the change procedure?

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# Appendices

Attachment to the research into  
flexibility of the DBFM contract

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# A1 Glossary

## Asset [bedrijfsmiddel, asset]

A tangible or intangible (economic) resource that represents value to an owner or controller of that asset. An infrastructure asset is such a tangible asset.

## Availability fee [beschikbaarheidsvergoeding]

The payment that the commissionee receives for the availability of the DBFM asset. According to schedule 2 of the DBFM standard (3.0) this payment is made from the commencement date and continues until and including the expiry date of the DBFM contract.

## Change [wijziging]

A change to the DBFM agreement. According to the DBFM standard (3.0) it can only be made through a document that is prepared and signed by the contracting parties for that particular purpose (§13).

## Change procedure [wijzigingsprocedure]

The change procedure as outlined in the DBFM standard (3.0). Terms are laid down in §13. The actual procedure is prescribed in schedule 5. Also see appendix A3.

## Client [opdrachtgever]

The contracting party that issues the commission, which can also be referred to as the 'contracting authority'. The public sector, i.e. Rijkswaterstaat or ProRail in the Netherlands, is a major client.

## Commission [opdracht]

The responsibility of the DBFM commissionee to design, build, finance and maintain the infrastructure asset.

## Commissionee [opdrachtnemer]

The contracting party that contracts with the client to complete the commission. This is usually a Special Purpose Company (SPC), which can also be referred to as the 'DBFM contractor' or 'DBFM company'.

## Concession contract [concessiecontract]

A type of Public Private Partnership (PPP) in which the client buys a service in a way so that risks are allocated to the commissionee.

## Contracting parties [contractpartijen]

Two or more persons or corporations that are party to a contract agreement (the DBFM contract), in which their liabilities towards a specific subject or undertaking are captured.

## Conventional contract ['traditioneel' contract]

A 'traditional' building contract (UAV 1989) in which there is hierarchical relationship between the client and the commissionee. After the client had a consultant (an architect and/or structural engineer) to draw up the design for the project, it enters into agreement with a contractor that executes the design. The client itself monitors the realisation of that design.

## Debt equity [vreemd vermogen]

The debt of the SPC that is used to finance the DBFM project.

DBFM contracts for infrastructures, which are high-value and long-life assets, are often characterised by stable revenues and therefore have long-term and fixed interest debts. (Delmon 2011:67)

## DBFM contract [DBFM contract]

An integrated contract in which the design, building, financing and maintenance of an asset is contracted to one commissionee that is responsible for those 4 aspects of the building process.

## Financial loss [financieel nadeel]

An increase in the commissionee's expenses or a decrease in its income, according to the DBFM standard (3.0).

## Financiers [financiers]

The private sector institutions that provide for the finance of the DBFM project.

## Flexibility of the DBFM contract [flexibiliteit van het DBFM contract]

Flexibility in a broad sense is the ability of the contract to 'effect changing circumstances'. In the narrow sense in this thesis is understood that this can be done through the change procedure, which can have the "ability to change or react to [changing circumstances] with little penalty in time, costs, effort or performance" (Upton 1995).

## Functional requirement [functionele eis, outputspecificatie]

The requirements in the DBFM contract that the asset must meet. These are not specific, but provide the boundary conditions of the commission. Can also be referred to as the 'output specifications' that are specified by the client.

## Integrated contract [geïntegreerd contract]

An agreement with which two or more aspects of a building project are integrally transferred to one single party. The DBFM agreement is such an integrated contract.

## Private equity [eigen vermogen]

The funds, comprising of share capital and other shareholder funds, which are invested in the Special Purpose Company (Delmon 2011:66).

## Public Private Partnership [Publiek Private Samenwerking]

A cooperation between public and private parties. Under contractual arrangements the parties aim to realise an agreed goal by means of a project-specific organisation. In this organisation they contribute resources, and share risks and benefits. (Bult-Spiering 2003:26)

## Special Purpose Company ['buitenbalansvehikel']

A new company, created by the private sector parties for the purpose of the project: the DBFM project company. Can also be referred to as the 'Special Purpose Vehicle'. (Delmon 2011:19)

## Tender [aanbesteding]

A contract document by which the commissionee expresses that it is willing to execute the commission. The tender documents, which include the bidders' proposal, shall become part of the DBFM contract. (Boot, Bruggeman et al. 2008:114)

## Value for money [meerwaarde]

A client's leading aim for choosing the DBFM contract. It implies efficient use of the government's money, as more quality should be realised for the same budget or the intended quality is realised with less budget.

## A2 Background information to the analytical framework

In this appendix, in brief sections, additional information is provided to the analytical framework.

### A2.1 Advantages and disadvantages of the DBFM contract

The DBFM model is characterised by advantages and disadvantages. One of the limitations is 'inflexibility'. See Table 19.

The Dutch Minister of Finance Mr Dijsselbloem (2012) notes that "the government prefers DBFM(O) on the condition that it delivers value for money" but reasons that "DBFM(O) is not an aim, but a means to realise the same quality [of the project] with a smaller budget".

Client	Commissionee
<b>Advantages</b>	
A more optimal allocation of risks to client and commissionee (Eversdijk and Korsten 2009:6)	A more optimal allocation of risks to client and commissionee (Eversdijk and Korsten 2009:6)
Financiers of the SPC serve as a watchdog over an optimal risk allocation in the realisation and the maintenance phase (Eversdijk and Korsten 2009:6)	
Value for money, which is efficiency through the life cycle approach of the asset by the commissionee (Eversdijk and Korsten 2009:5) In the Netherlands about 10% to 15% added value is created for DBFM(O) projects (inclusive of building projects) (Ministerie van Financiën 2012:6)	Life cycle approach can result in efficiency gains (Koppenjan and Van Ham 2002:24)
The time needed for realisation is usually shorter than for conventional contracts (Eversdijk and Korsten 2009:6); in the Netherlands DBFM(O) projects are regularly delivered on time and within budget (Ministerie van Financiën 2012:6)	
DBFM offers the ability to spread the costs of the investment over the lifetime of the asset (Deloitte & Touch 2008:3) and the public sector knows in advance what it will be spending on the project (National Audit Office 2008:7)	
Interface risks transferred to the commissionee because of the integrated supply chain (Eversdijk and Korsten 2009:6)	
<b>Disadvantages</b>	
Limited utilisation of knowledge, experience and creativity of commissionee because of the hierarchical relationship between client and commissionee (Eversdijk and Korsten 2009:6)	The financiers of the SPC are rather risk averse, while for the optimisation of the life cycle risks are accepted by the SPC and flexibility to be innovative is necessary (Eversdijk and Korsten 2009:14)
Through financiers of SPC decreased interaction, flexibility and acceptance of risks by the commissionee, which are necessary for value creation in projects (Eversdijk and Korsten 2009:6)	
Large transaction costs due to complexity of contracts, larger costs due to longer tender period than traditional contracts and private finance more expensive than public borrowing (Deloitte & Touch 2008:3; Eversdijk and Korsten 2009:6)	
Inflexibility because of the long term of the agreement versus changing circumstances (Eversdijk and Korsten 2009:6)	

Table 19 Advantages and disadvantages of the DBFM Contract

### A2.2 Additional aspects of realisation (design and build)

The design & build phase is 'over' when according to a detailed procedure, which is laid down in the contract, the asset is technically available for use. The availability date as referred to in the availability certificate, which has to be issued by the client of the DBFM contract, indicates the starting date from which the client pays the commissionee a quarterly availability fee. (Koster, Hoge et al. 2008:20)

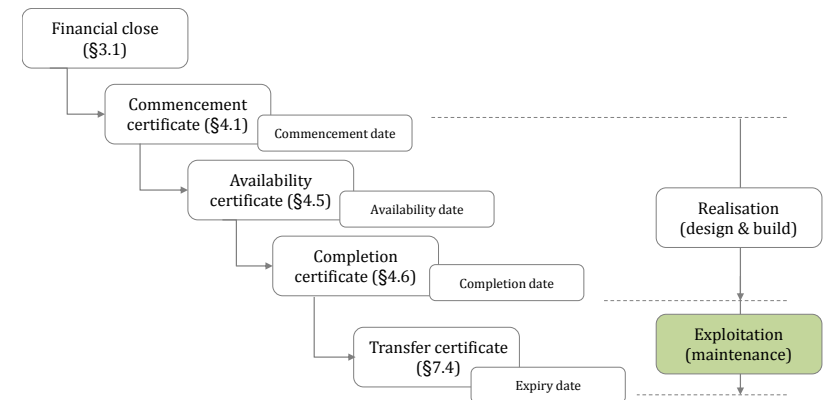


Figure 24 Certificates of the DBFM contract

### A2.3 Additional aspects of maintenance

In the DBFM contract the commissionee has the obligation to carry out regular maintenance activities. Besides, it has to make larger investments in the asset to keep it up to date. Due to the fact that the contractor's maintenance activities can (temporarily) decrease the availability of the infrastructure, the maintenance activities should be laid down in a maintenance plan at the outset of the DBFM project, so that the availability fee can be synchronised with the contractor's maintenance activities. (Koster, Hoge et al. 2008:17)

Further, it is important to understand that the DBFM contractor's obligations to maintain the asset commence when the asset is handed over to the commissionee. This is why the commissionee earns a small fee in the realisation phase already. The *Tweede Coentunnel* road project in the Netherlands exemplifies this mechanism. Namely, in the project's DBFM contract is mentioned explicitly that besides the construction of a second tunnel under the *Noordzeekanaal*, the original 'first' Coentunnel must be maintained by the contractor for 30 years.

### A2.4 A detail on the roles of the DBFM contracting parties

Because in DBFM the private sector focuses on innovation and optimisation of the asset, the public sector can focus on managing the road network. This can be regarded as a bundling of strengths that "allows the public sector client to retain overall control over assets and core activities, while the private sector is responsible for the provision of supporting services" (PPP Unit date unknown).

### A2.5 Interests of the shareholders of the SPC

It is said that "companies are in the concession business [the SPC] to obtain returns to investment and as a means to achieve a spreading of investment risks" (Albalade 2008:221). The private companies' business aim from a private point of view is:



- Continuation of business, in other words: turnover
- Maximum financial-economic return on investments: profit (Bult-Spiering 2003:31)

Of course the private sector companies in the DBFM project assess every new project separately. Albalade (2008:220) notes that in for example toll road projects (see Figure 13), the private sector companies take into account "demand forecasts, user's willingness to pay and building and operating costs".

## A2.6 The difference between infrastructure and housing

The Dutch government has drafted two different contracts, namely for buildings and for infrastructure. However, the principles of the DBFM contract apply to the DBFMO contract for buildings too. In this contract the O stands for operate, which brings a greater responsibility for the commissionee.

Hamdan, Van Baekel et al. (2011:22) note that the output specifications for buildings concern the buildings' spaces and facilities, whereas for infrastructure the specifications focus on the quality of the road. Due to the different nature of the construction projects other responsibilities are allocated to the contracting parties. As opposed to infrastructure, in DBFMO contracts the commissionee is responsible for the operation of facilities such as the catering and the security. As a threshold the projects of the Rijksgebouwendienst should be characterised by a €25 million threshold value (Ministerie van Financiën 2012:2).

## A2.7 Uncertainty in (complex) construction projects

The environment of construction projects is inevitably dynamic. Cruz and Marques (2012) note that in estimations of the future, such as planning schemes, unpredictability makes up a great part. Skamris and Flyvbjerg (1997, in Tan and Yang 2012:1420) for example see that traffic demand forecasts in road transportation projects can differ from reality by 20 – 60%. Road networks and investment in road networks are therefore subject to uncertain future developments.

However, there is a contradiction between this inevitable uncertainty as opposed to the certainty a contract in principle provides. According to Deloitte & Touch (2008:5) "the public sector needs a high degree of certainty about the desired output specification" whereas functional requirements in fact introduce more freedom, i.e. flexibility for the DBFM contractor(s). Boot, Bruggeman et al. (2008:177) point to this contradiction too by stating that the contract should provide for "proper possibilities for effecting changes, however, without robbing the contract of the certainties it provides". What is more, Leunissen (2011:X) argues that "parties will not enter [into] an agreement or will not be committed if they have no form of certainty". Consequently, that author justly questions how to incorporate flexibility in the contract, because a contract is drawn for means of certainty.

Hertogh, Baker et al. (2008) illustrate that the more complex a project is the more changing circumstances are likely to occur as uncertainty can originate from complexity. They exemplify this by means of two transportation infrastructure projects, namely the UK West Coast Main Line and the E18 road project in Finland. Like each project these projects are characterised by its own context.

So, about the West Coast Main Line, which is a PFI project, a large debate was going on in the United Kingdom's government with respect to the choice of the contract and its duration. It is concluded that because of a number of issues, which are difficult to define in the tender stage due to information asymmetry, it is difficult to ensure value for money. The issues were: the rail project is characterised by (technical, organisational) interfaces that make the project more

complex; often rail projects are large and uncertain; and railway projects are usually characterised by very large risks.

The counterexample is the E18 motorway project, which is a DBFM project in Finland and is "constructed in a thinly populated area, with a thorough knowledge of environmental risks". Besides, because of a set of other factors, such as that the project organisation worked in 'good' collaboration with the financing banks, this project was a success in the sense that the client and the commissionee were satisfied due to the fact that the contract was clear and 'stable'.

## A2.8 Complexity

Van Marrewijk notes that uncertainty in 'mega-complex' projects, i.e. infrastructure projects through PPP's for example, lack clarity and agreement on project goals and how to achieve these (2009, in Schouten 2012:22).

In terms of procurement management the client "needs to have a solid grasp on what the organisation wants in terms of maintenance" (PPP Unit date unknown:13). In that respect in theory the DBFM contract seems to be unsuitable for complex projects; it is difficult to determine which service the commissionee should deliver in the exploitation phase.

What is complexity? According to Hertogh and Westerveld (2010:131) in practice complexity in projects is seen in either the characteristics of the projects, or in the development of the implementation process of it.

Projects are tightly connected to their context; secondly, are multiplayer games with large differences in interests; and are established in a unique context.

With respect to complexity in the development of the implementation process it is seen that the implementation process is non-linear, because goals and routes to goals are ambiguous; further, that projects have unique starting positions and subsequent events; and that complexity is present in the whole process.

What makes infrastructure projects complex are the interactions and interdependencies of for example "the large amount of other public and private partners [other] than those involved in straight [direct] cooperation" (Schouten 2012).

## A2.9 What changing circumstances can be expected in the long term?

Although from literature study it was concluded that there is very limited information about changing circumstances in the exploitation phase of DBFM projects, some indications can be found.

Krüger (2012:1359) notes that there is "uncertainty with regard to traffic demand, deterioration and costs". With respect to infrastructure projects this author also writes that expansion of a road is a characteristic case for the exploitation phase. According to Tan and Yang (2012:1420) "road deterioration and maintenance and the effect of economic growth over the years" are circumstances that change on the longer term.

Contrary, "the case of a simple road expansion can naturally be specified in a contract, and is therefore not representative of all different future contingencies that cannot be specified in the contract" (Krüger 2012:1362).

## A2.10 The concept of flexibility, and related concepts

Anticipation (first bullet) does however not necessarily mean that there is a planning to it, but it implies that actions have been undertaken before the fact actually happens, whereas this is not the case with unanticipated (2011:927); the system then has to recover from a change.

Yet in the main report some concepts that in literary sense are related to 'flexibility' were discussed. Namely, adaptivity, robustness and resilience. De Haan, Kwakkel et al. (2011) have defined these concepts according to four dichotomies (dualities). See Table 20.

	Anticipation or recovery	Disturbance or change	Accommodate or adjust	Swift or gradual
<b>Flexibility</b>	Anticipation	Change	Adjust	Gradual
<b>Adaptivity</b>	Recover	Change	Accommodate	Gradual
<b>Robustness</b>	Indifferent	Change	Accommodate	Gradual
<b>Resilience</b>	Recover	Disturbance	Accommodate	Swift

Table 20 Flexibility and related concepts defined according to four dichotomies (free from De Haan, Kwakkel et al. 2011)

It can be understood that flexibility is the capacity "to change functioning that is already present in the system" (adjust) contrary to adaptability that is an ability "to change the structure of the system in order to change functioning" (accommodate) (2011:927). The authors use the dichotomy of accommodate vs. adjust here, however they expected that flexibility is an accommodate word instead of an adjust word. Adjustment means that something needs to be altered to keep on functioning, whereas accommodation suggests there is a margin to allow for functioning in a changed situation. But from the article it is seen that there is quite a subtlety in if adjust or accommodate is related to a system that changes itself in response to changed circumstances. Apart from this discussion the most important things is to remember that with flexibility the system does not change.

Flexibility is further characterised by an anticipatory quality (anticipation), referring to changes on the longer term. Something that is flexible thus is prepared for a change. The authors make a distinction between anticipated and unanticipated. Anticipation does not necessarily mean that there is a planning to it, and the concept indicates that there is a *lack* of knowledge of the future. Further 'anticipation' implies actions before the fact actually happens, whereas this is not the case with unanticipated. The system then has to recover. (2011:927)

Flexibility also has a gradual connotation, which means for example that the system constantly needs to withstand or recover from changes, or that it has to deal with a trend-like change.

## A2.11 Origin of changes

In literature much is written about the origin of changes and classifications of origins start from a division in internal and external causes (Sun and Meng 2009; Bröchner and Badenfelt 2011:768). Sun and Meng (2009:570) have add another primary change cause level to their taxonomy, namely organisational causes that are "related to organisations directly involved in the project". These are project-independent as those organisations are usually involved in more than one project at the time (Sun and Meng 2009:568). Akinsola, Potts et al. (1997) write about it too.

The hierarchical approach of the taxonomy as presented in Table 20 ensures that every possible cause can in fact be assigned to one of the levels of the taxonomy, i.e. classification.

The overview is comprehensive but non-exhaustive, and serves as a generic template.

Level 1 Origin	Level 2 Factors	Level 3 Description
External	Environmental	Conservation restrictions
		Weather conditions
		Natural disaster
		Geological conditions
	Political	Unforeseen ground conditions
		Changes in government policies
		Changes in legislation
	Social	Delays in planning permission approval
		Demography change
		Skill shortage on certain trades
Internal (project)	Economical	Opposition of neighbouring community
		Economic development cycle
		Inflation
	Technological	Market competition
		New materials
		New construction methods
	Client	Technology complexity
		Requirement change and variation
		Funding change
		Slow decision making
	Design consultant	Payment delays
		Difficulty in site acquisition
		Poor, incomplete drawings
	Contractor	Design change due to errors and omissions
		Inconsistent site changes
		Poor project plan/schedule
		Delays in appointing subcontractor
		Delay of subcontractor's work
Organisational	Process related	Poor workmanship
		Low productivity
		Poor logistic control
	People related	Poor interdisciplinary communication
		Team instability
		Inappropriate project organisational structure
	Technology related	Organisation business strategy
		Business procedures
		Quality Assurance procedures
		Competence and skills
		Culture and ethics
		IT and communication systems
		Technical supports

Table 21 Taxonomy of origin of change (free from Sun and Meng 2009:567)

## A2.12 The European procurement rules in relation to changes

According to European procurement legislation, the projects under study in this research are “works contracts, works concessions contracts, [or] subsidised works contracts”. When the value of these projects equals or is larger than the threshold value of €5 mio, European procurement is obligatory:

Hebly and Heijnsbroek (2008) write about fundamental<sup>21</sup> changes and state that it is essential to act within the boundaries of the European procurement regulatory framework while processing changes.

Namely, only under certain preconditions the client can assign the complementary works inherent to a change to the DBFM contractor without public procurement. What is important is that the works inherent to the change should have been unforeseen at the outset of the project, and further that such works are necessary for completion or continuation of the exploitation of the project as a whole. Thirdly, the assignment inherent to the change must form an essential part of the project as a whole, i.e. the assignment should not stand apart in a technical or economic sense. And finally the total value of the works may not exceed 50% of the original assignment. (Hebly and Heijnsbroek 2012:95)

## A2.13 The relation between risks and changes

Of course this thesis has interfaces with other topics in the knowledge field of ‘construction management’. One of these is: risk management.

Before was mentioned that flexibility is a way to deal with uncertainty. Winch (2006:315) notes that when a probability distribution can be assigned to information that is lacking, uncertainty becomes a risk. The probability is the chance of occurrence of a future event. Boothroyd and Emmett (1996, in Akintoye, Beck et al. 2003:36) argue that “a risk occurs where either the outcome or consequence of an activity or decision is less than certain”.

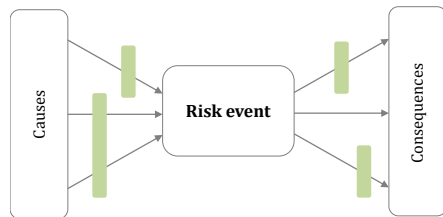


Figure 25 In risk management the causes and consequences can be mitigated (free from Verbraeck 2010)

There are several strategies to mitigate risks, namely by mitigating the risk event's causes or its consequences. A cause can be avoided or reduced. After a risk has materialised, the risk can be transferred to another party ('transfer') or a contingency plan can be established ('accept').

## A2.14 Division of risks

Tan and Yang (2012) note that there are different degrees of contract flexibility. As a result, there are different degrees of risks born by the contracting parties. Therefore it is “necessary to determine the required return rate (internal return rate plus the risk premium) under different degrees of flexibility and investigate the effects of the flexibility on the efficiency of the highway projects with congestion effects” (2012:1435).

In that perspective Cruz and Marques (2012) present an important notion in their article on how to cope with uncertainty in PPP's, namely that contract flexibility should increase a project's (net present) value. This means that nor the value for the client or for the commissionee is regarded separately but rather as a whole. The problem of uncertainty is thus regarded from a socio-economic point of view.

With a rigid contract that does not allow for flexibility, because all contract variables are ex ante determined to prior knowledge, private investors “bear the entire ex post demand risk” (Tan and Yang 2012:1424). Contract variables are for example capacity, concession period, toll charge and subsidy size. So-called interdependent flexibilities adjust the risk sharing in a project. These flexibilities shift the impact of unforeseen events from one party within the project to another; from the client to the commissionee or vice versa. From the socio-economic perspective there also exists what Cruz and Marques (2012) call individual flexibility. This means incorporating options that increase the value for the commissionee without a decrease of the value for the client.

<sup>21</sup> Dutch: wezenlijke wijziging.



## A2.15 Change procedure in the DBFM contract 3.0 by Rijkswaterstaat

Appendix to Figure 11.

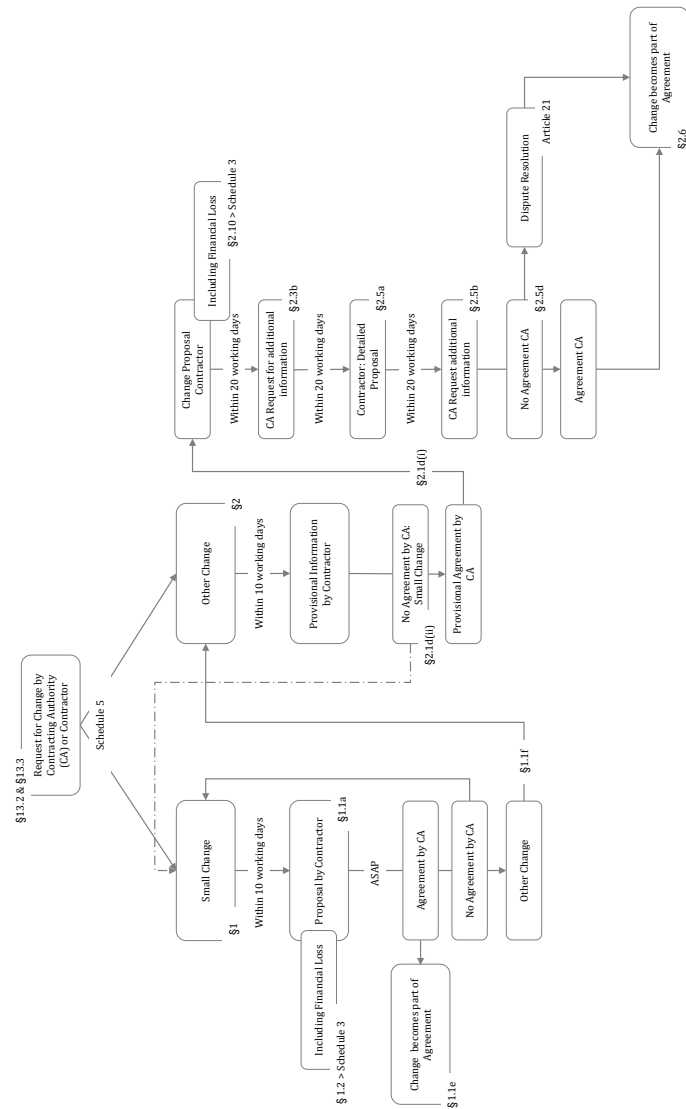


Figure 26 Schematic representation of the change procedure as prescribed in the Rijkswaterstaat DBFM contract version 3.0

## A2.16 Contractual versus relational governance and contracting

It was seen that contracts are juridical measures in the first instance. Therefore, contracts can promote conflicts and defensive behaviour. It is observed that a “relational perspective emphasises the role of trust in achieving mutually successful supply outcomes” (Zheng, Roehrich et al. 2008:44). Thereto so-called relational governance mechanisms are developed, which are “based upon social processes, like trust, that promote norms of flexibility, solidarity and information exchange can safeguard, albeit informally, against exchange hazards and facilitate the enforcement of obligations.” (Zheng, Roehrich et al. 2008:44) Especially in long-term contracts this problem solving approach that focuses on both contracts and relationships can be utilised. Their joint use is said to generate “more efficient outcomes than the use of either in isolation” (Zheng, Roehrich et al. 2008:45).

Therefore, it is seen that flexibility of the DBFM contract cannot be decoupled from how relationships work, and therefore what interests are at stake. Colledge (2005:32) argues that most construction projects, as these are complex by nature, evidence some form of relational contracting. See Figure 27.

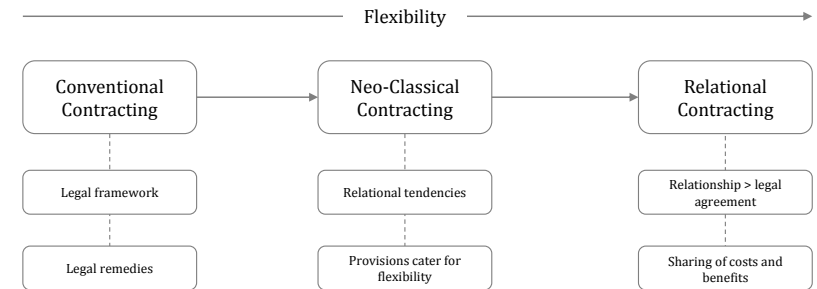


Figure 27 Forms of relational contracting

### Relationships and cooperation in infrastructure projects

Schouten (2012) has studied the cross-cultural collaboration between the public and the private party in the A2 road infrastructure project in the Netherlands. It provides apt insights into the relationships in such a project from an anthropological perspective. One of the daily practices he has observed in the case study is “negotiating around contract ambiguity” (2012:106). This is about ambiguity in the sense that there is “disagreement on how the contract has to be controlled and a tension between contractual arrangements and practice” and “about what it means to adhere to the letter of the contract” (2012:91).

## A3 The conceptual model of the analytical framework

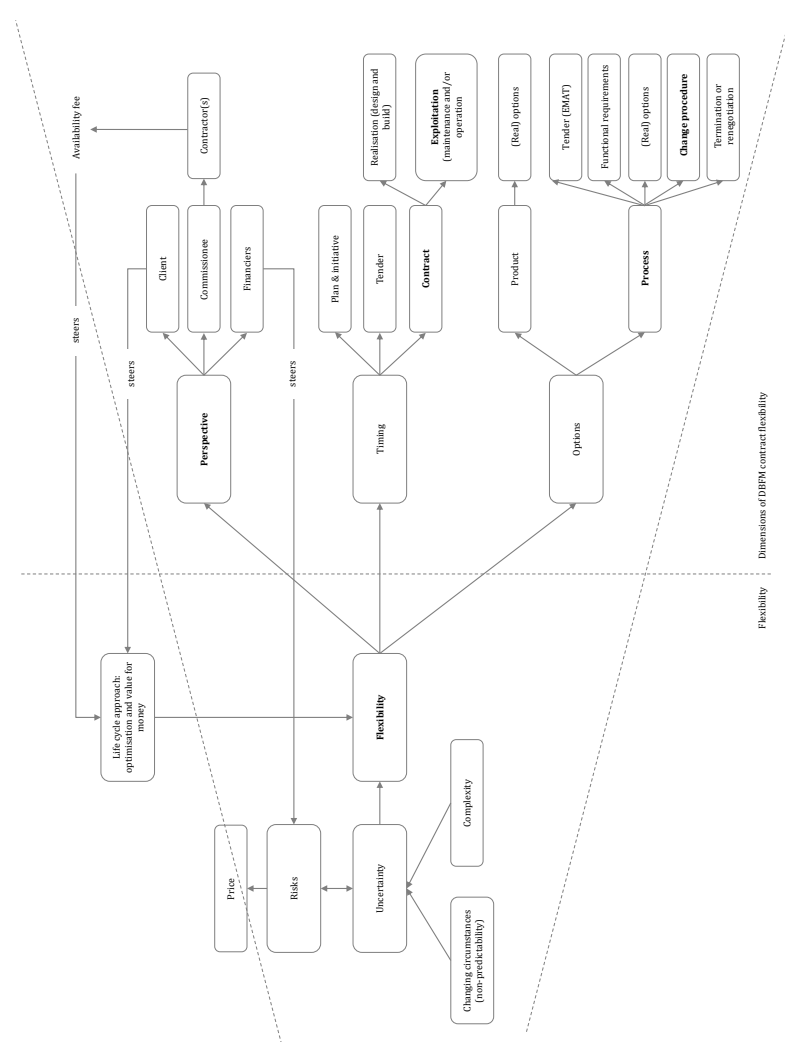


Figure 28 Conceptual model based on the literature study

## A4 Background information to the methodology

### A4.1 Overview of integrated contracts in the Netherlands

Below, Table 1 and Table 2 provide an overview of the long term integrated contracts in the Netherlands, i.e. the projects (both infrastructure and accommodation) wherein maintenance of the asset is included in the assignment.

	Project	Contract type	Contract term (y)	Project phase	Phase since
Infrastructure	A59	DBFM	18	Exploitation	2005
	N31 Wâldwei	DBFM	15	Exploitation	2007
	HSL-Zuid	-	-	-	-
	Superstructure	DBFM	25	Exploitation	2009
	Substructure	DB (6x)	Several	Maintenance	
	A12 Utrecht-Veenendaal	DBFM	23	Exploitation	2012
	A10 Tweede Coentunnel en A5 Westrandweg	-	-	-	-
	Coentunnel	DBFM	30	Maintenance	2008
	Tweede Coentunnel	DBFM	30	Realisation	2008-2013
	A15 Maasvlakte - Vaanplein	DBFM	20	Realisation	2011-2015
	SAA (Schiphol - Amsterdam - Almere)	-	-	-	-
	A10 Oost (Watergraafsmeer) - A1 Diemen	D&C	3	Realisation	2012-2014
	A1/A6 Holendrecht - Almere Havendreef	DBFM	30	Realisation	2014-2020
	A9 Holendrecht - Diemen	DBFM	N.a. yet	Plan	2015-2021
	A9 Badhoevedorp - Holendrecht	DBFM	N.a. yet	Plan	2016-2020
	A6 Almere Havendreef - Almere Buiten Oost	DBFM	N.a. yet	Plan	2017-2020
	A12 wegverbreding Ede - Grijsoord	DBFM	N.a. yet	Plan	2011-2013
	Sluis Limmel	DBFM	N.a. yet	Tender	2012
	N33 Assen-Zuidbroek	DBFM	20	Realisation	2013
	N18 Varsseveld-Enschede	DBFM	N.a. yet	Preparation	2013
	Project Afsluitdijk	DBFM	N.a. yet	Initiative	2008
	A27/A1 Utrecht - knooppunt Eemnes - Amersfoort	DBFM	N.a. yet	Initiative	2012
	Twentekanaal - Sluis Eefde	DBFM	N.a. yet	Plan	2009
	Zeetoeegang IJmond	DBFM	N.a. yet	Plan	2009
	Kanaalzone Gent-Terneuzen	DBFM	30	Plan	2009
	Afvalwaterzuiveringsinstallatie Haagse Regio	DBFO	30	Exploitation	2007/2008
	Baanverlenging Groningen Airport Eelde	DBFM 'light'	10	Exploitation	2013
	RegioTram Groningen	DBFMO	23	On hold	2010
	ViA15	DBFMO	23	Initiative	2008
	N11	DBM	10	Exploitation	2004
	N475 Zijdeweg	DBM	20	Exploitation	2008
	N302	DBM	15	Exploitation	2010
	BRAVO 6a/6b - Zuidwestelijke randweg Harmelen	DBM	15	Realisation	2010
	Spuicapaciteit Afsluitdijk	DBM	N.a. yet	Preparation	2012
	N322 Druten - Beneden Leeuwen	DCM	10	Exploitation	2010
	Stadsbrug Nijmegen	DCM	20	Realisation	2010

Table 1 Overview of integrated contracts in the Netherlands as of May 2013 (from Programma KING 2010; PPS Netwerk Nederland BV 2012) (n.a. = not available)

	Project	Contract type	Contract term (y)	Project phase	Phase since
Accommodation	Renovatie Ministerie van Financiën	DBFMO	25	Exploitation	2008
	Nieuwbouw Belastingkantoor Doetinchem	DBFMO	15	Exploitation	2010
	Kromhout Kazerne	DBFMO	25	Exploitation	2010
	Nationaal Militair Museum Soesterberg	DBFMO	25	Realisation	2013
	Nieuwbouw Hoge Raad der Nederlanden	DBFMO			
	Zorgacademie Parkstad Limburg	DBFMO			
	Penitentiaire inrichting Zaanstad	DBFMO			
	Internationale school Eindhoven	DBFMO			
	PPS Lindeplein Brunssum	DBFMO			
	Vernieuwing Rijnstraat 8	DBFMO			
	Bezuidenhoutseweg 30 Den Haag	DBFMO			
	Gerechtsgebouw Breda	DBFMO			
	Gerechtelijke organisatie Amsterdam	DBFMO			
	Rijksinstituut voor Volksgezondheid en Milieu (RIVM)	DBFMO			
	Nieuwbouw kantoor Dienst Verkeer en Scheepvaart	DBFMO			
	Transferium Zevenaar – Oost	DBFMO			
	Zorgacademie Heerlen	DBFMO			
	Stichting Amarantis Onderwijsgroep	DBFMO T(ransfer)			
	Montaigne Lyceum	DBMO	30	Exploitation	2006
	Kunstijsbaan Twente	DBMO			
	Veenweidebad de Ronde Venen	DBMO			
	Brede School Joure	DBM			
	Stadkwartier Deventer	DBM			
	HagaZiekenhuis	DBM			
	Stadhuis Den Helder	DBM			

Table 2 Overview of integrated accommodation contracts in the Netherlands as of May 2013 (from Programma KING 2010; PPS Netwerk Nederland BV 2012) (n.a. = not available)

## A4.2 Methodology

### A4.2.1 Phase 1: construction of the analytical framework

In phase 1 a literature study is conducted to study the research problem in depth, i.e. to map the problem statement in its context. Thereto four subjects were chosen, to wit:

- Changing circumstances that can influence a construction project
- Flexibility and flexibility of the DBFM contract
- The DBFM contract
- The role of the contracting parties and the financiers in DBFM

The above subjects were used as key words in (online) literature databases. From the available literature, which includes journal articles but also presentations and information leaflets, a conceptual model is established, see appendix A2.15. Together with four propositions, see section 3.1.5, this forms the analytical framework.

### A4.2.2 Practical application of the propositions

Each of the propositions implies an if-then relationship. Therefore both parts of the hypotheses – the ‘if’ and the ‘then’ – are assessed. How to use the propositions in the research?

#### I. The more changes are made the more flexible the DBFM contract is

The first proposition states that the more changes can be made the more flexibility of the contract there is. From the case study interviews the number of changes is observed and further the respondents were asked whether they ‘felt’ that there was flexibility in the contract. Those two aspects are confronted, and from that the research can conclude whether the number of changes provides for flexibility of the DBFM contract.

#### II. There is flexibility of the DBFM contract if there is little penalty in time, costs, effort or performance

The definition of Upton (1995) is employed in the following manner:

- **Time**  
Throughput times of the change procedure, i.e. from first formal proposal to formal approval of change. Thereafter a change can be implemented and/or effected.
- **Costs**  
The costs of a change constitute of:
  - Capital costs: the real costs of the change  
Prepared by the EPC and/or MTC contractor(s)
  - Maintenance costs  
Prepared by the MTC contractor
  - Life cycle costs, i.e. replacement or overhaul of asset over life time  
Prepared by the MTC contractor
  - Overhead costs – a fixed fee – for amongst others calculating and assimilating the change  
Prepared by the SPC
  - Redemption of risks incurred under the change
- **Effort**  
This is a rather ‘soft and intangible’ aspect of the definition and is assessed on:
  - Measures of communication between the contracting parties
  - Relationship of contracting parties and effectiveness of it



- General negative or positive energy from the interviews

The view of the contracting parties (of the interviewees) plays a major role in this. What 'effort' entails for one party is not 'effort' for the other.

- **Performance**

The desired project result(s) versus aim and origin of changes.

**III. There is less flexibility for the commissionee than for the client due to the 'watchdog' role the financiers fulfill in the DBFM model**

Proposition III is tested by focusing on the interests of the financiers and in particular how they assess change proposals. If these conflict with the SPC's and contractor's interests in changes, and those of the client, there can be less flexibility for the commissionee than for the client.

**IV. The DBFM contract is not flexible if change proposals are rejected**

What does the number of rejected change proposals imply? The number of changes that is proposed is confronted with the number of changes that is concluded (completed). Do the contracting parties feel that the DBFM contract is less flexible if their change proposals are rejected?

## A4.3 Interview protocol for case studies phase 2<sup>a</sup> (Dutch)

### Context van het interview

Dit interviewprotocol is bedoeld voor de interviews in het kader van mijn afstudeeronderzoek voor de MSc Construction Management & Engineering aan de TU Delft, Faculteit Civiele Techniek. Dit onderzoek verwacht ik vóór de zomer van 2013 af te ronden.

Het onderwerp van het afstudeeronderzoek is flexibiliteit van DBFM contracten voor infrastructurele projecten, dat op het moment veel in de belangstelling staat van zowel professionals uit de praktijk (publiek én privaat) als uit de academische wereld.

Er is nog maar weinig kennis van flexibiliteit van geïntegreerde contracten zoals DBFM. Nog minder is daarover bekend op de lange termijn, omdat het DBFM model in Nederland nog niet zo lang wordt toegepast, dit in tegenstelling tot landen zoals het Verenigd Koninkrijk. De lange termijn is echter een essentieel kenmerk van een DBFM, want daarmee wordt naar meerwaarde gezocht met behulp van de *life cycle approach*. Omdat er echter per definitie omstandigheden veranderen, bestaat er een spanning tussen het DBFM model (overeengekomen voor een periode van 10 tot 30 jaar) en de context van de DBFM. Op basis van deze probleemstelling is het doel van het onderzoek om aanbevelingen te doen voor de DBFM aanpak voor Nederlandse infrastructurele projecten.

### Doel van het interview

In het onderzoek is geconstateerd dat flexibiliteit van een DBFM op meerdere plekken in het contract is te 'vinden'. Dit afstudeeronderzoek richt zich op de vraag welke flexibiliteit de wijzigingsprocedure biedt op de lange termijn (in dit onderzoek: in ieder geval na de beschikbaarheidsdatum). Het voornaamste doel van het interview is daarom ook om inzicht te krijgen in de wijzigingen in de onderhouds- en beheerfase het betreffende DBFM project. Daartoe wordt in het interview empirische data verzameld, die moet leiden tot het beantwoorden van de onderzoeksvragen uit het afstudeerproject.

### Inhoud van het interview

In het interview gaat het om:

- De wijzigingen in het DBFM project die voorgesteld en geaccepteerd zijn in de onderhouds- en beheerfase:
  - Tijd, kosten, 'inspanning' en uitvoering van die wijzigingen
  - Hoeveel er door de organisatie waarbinnen de geïnterviewde(n) werkzaam is zijn voorgesteld, waarom, en ook of er wijzigingen niet zijn doorgegaan
- De beleving van de geïnterviewde(n) ten opzichte van bovenstaande

Het interview wordt enkel afgenomen door mijzelf.

### Resultaat van het interview

Voor elk geselecteerd project wordt een interview gehouden met de werknemer die de wijzigingen in het project beheert aan zowel opdrachtgevers- als opdrachtnemerszijde. Hierdoor ontstaat een evenwichtig beeld van de wijzigingen in die projecten. De informatie uit het interview wordt verwerkt in een verslag, dat wordt gebruikt in het kader van het afstudeeronderzoek. De belangrijkste bevindingen worden opgenomen in het eindrapport, en geïnterviewde(n) krijgt de resultaten daarvan opgestuurd.

### Werkwijze voor het interview

Voor het verloop van het interview zijn de volgende punten van belang:

- In het interview krijgt de geïnterviewde(n) de gelegenheid om informatie over de wijzigingen toe te lichten en aan te vullen; het is een *semigestructureerd* interview.
- Voor het onderzoek zijn de wijzigingen in de onderhouds- en beheerfase van het specifieke project van waarde. In het interview wordt *in principe niet gezocht* naar wijzigingen uit andere projecten.
- Als er vragen of onderwerpen aan de orde komen waar de geïnterviewde(n) geen antwoord op kan geven, bijvoorbeeld als dit de organisatie schade kan berokkenen, dan wordt gezocht naar een omschrijving of benadering.
- Voor het interview is een afspraak van 90 minuten gepland, maar ik stuur er op dat het daadwerkelijke interview in 60 minuten is afgerond.
- Het interview wordt met toestemming van de geïnterviewde(n) *opgenomen*. De opname en aantekeningen worden alleen gebruikt in het kader van dit afstudeeronderzoek, en zullen daarmee *vertrouwelijk* worden behandeld.
- Na het interview wordt per e-mail een concept *uitwerking* toegestuurd aan de geïnterviewde(n), die daarop op- en aanmerkingen kan geven. De gecorrigeerde uitwerking wordt verwerkt in het eindrapport; de uitwerking zelf wordt niet opgenomen in (de publieke versie van) dat rapport.
- Wanneer het onderzoek is afgerond krijgt de geïnterviewde(n) (de publieke versie van) het rapport toegestuurd.

#### Het interview

##### Introductie (ca. 10 min)

- Kennismaking
- Toelichting verloop van het interview

##### Wijzigingen in de onderhouds- en beheerperiode (ca. 20 min)

- Aantal wijzigingen; wat vindt geïnterviewde(n) daarvan?
- Hoe is de procedure verlopen voor de wijzigingen?
- Flexibiliteit bestaat volgens een bepaalde definitie als er 'little penalty in time, costs, effort or performance' (Upton 1995) is (toelichting). Is volgens de geïnterviewde(n) sprake van gevolgen voor het project ten aanzien van:
  - De planning en doorlooptijden van de procedure
  - De kosten van de wijzigingen
  - Het algehele proces en 'gevoel' over het project
  - Uitvoering van de wijziging, resultaat er van

##### Flexibiliteit van DBFM, en andere wijzigingen in de onderhouds- en beheerfase (ca. 25 min)

- Hoeveel wijzigingen zijn er door de organisatie waarbinnen de geïnterviewde(n) werkzaam is voorgesteld, en hoeveel daarvan zijn niet geaccepteerd? Waarom?
- Wat zijn afwegingen waarom wijzigingen wel of niet worden voorgesteld, en waarom?
- Welke flexibiliteit biedt de wijzigingsprocedure in de DBFM? En hoe kan flexibiliteit anders dan de wijzigingsprocedure geboden worden?
- Wanneer is flexibiliteit van het DBFM contract nodig, en wanneer niet?

##### Afsluiting (ca. 5 min)

- Wat verder ter tafel komt
- Termijn voor verwerking van het interview & terugkoppeling
- Benaderbaar voor aanvullende vragen?
- Bedankt

## A4.4 Interview protocol for phase 2<sup>b</sup> (Dutch)

#### Context van het interview

Dit interviewprotocol is bedoeld voor de interviews in het kader van mijn afstudeeronderzoek voor de MSc Construction Management & Engineering aan de TU Delft, Faculteit Civiele Techniek. Dit onderzoek verwacht ik vóór de zomer van 2013 af te ronden.

Het onderwerp van het afstudeeronderzoek is flexibiliteit van DBFM contracten voor infrastructurele projecten, dat op het moment veel in de belangstelling staat van zowel professionals uit de praktijk (publiek én privaat) als uit de academische wereld.

Er is nog maar weinig kennis van flexibiliteit van geïntegreerde contracten zoals DBFM. Nog minder is daarover bekend op de lange termijn, omdat het DBFM model in Nederland nog niet zo lang wordt toegepast, dit in tegenstelling tot landen zoals het Verenigd Koninkrijk. De lange termijn is echter een essentieel kenmerk van een DBFM, want daarmee wordt naar meerwaarde gezocht met behulp van de *life cycle approach*. Omdat er echter per definitie omstandigheden veranderen, bestaat er een spanning tussen het DBFM model (overeengekomen voor een periode van 10 tot 30 jaar) en de context van de DBFM. Op basis van deze probleemstelling is het doel van het onderzoek om aanbevelingen te doen voor de DBFM aanpak voor Nederlandse infrastructurele projecten.

#### Doel van het interview

In het onderzoek is geconstateerd dat flexibiliteit van een DBFM op meerdere plekken in het contract is te 'vinden'. Dit afstudeeronderzoek richt zich enerzijds op de vraag welke flexibiliteit de wijzigingsprocedure biedt op de lange termijn (in dit onderzoek: in ieder geval na de beschikbaarheidsdatum), en daarnaast hoe de contractpartijen met flexibiliteit omgaan. Het voornaamste doel van het interview is om inzicht te krijgen in de visie van de geïnterviewde(n) op flexibiliteit van een DBFM contract voor infrastructurele projecten. Daartoe wordt in het interview gezocht naar zienswijzen op en mogelijkheden voor flexibiliteit van een DBFM, die moet leiden tot het beantwoorden van de onderzoeksvragen uit het afstudeerproject.

#### Inhoud van het interview

In het interview gaat het om:

- Visie van geïnterviewde(n) op flexibiliteit van een DBFM contract, gelet op organisatie waarin geïnterviewde(n) werkzaam is (en was)
- Kansen en beperkingen van flexibiliteit, specifiek voor de organisatie en/of project waarin geïnterviewde(n) werkzaam is

Het interview wordt enkel afgenomen door mijzelf.

#### Resultaat van het interview

Voor een evenwichtig beeld van de visies op contract flexibiliteit worden interviews gehouden met werknemers van zowel publieke als private zijde, en bovendien met werknemers uit de gerechtelijk/juridische sector alsook de financiële sector.

De informatie uit het interview wordt verwerkt in een verslag, dat wordt gebruikt in het kader van het afstudeeronderzoek. De belangrijkste bevindingen worden opgenomen in het eindrapport, en geïnterviewde krijgt de resultaten daarvan opgestuurd.

## Werkwijze voor het interview

Voor het verloop van het interview zijn de volgende punten van belang:

- In het interview krijgt de geïnterviewde de mogelijkheid om onderwerpen en vraagstukken toe te lichten naar eigen inzicht; het is een ongestructureerd of *open* interview.
- Als er vragen of onderwerpen aan de orde komen waar de geïnterviewde geen antwoord op kan geven, bijvoorbeeld als dit de organisatie schade kan berokkenen, dan wordt gezocht naar een omschrijving of benadering.
- Voor het interview is een afspraak van 90 minuten gepland, maar ik stuur er op dat het daadwerkelijke interview in 60 minuten is afgerond.
- Het interview wordt met toestemming van de geïnterviewde *opgenomen*. De opname en aantekeningen worden alleen gebruikt in het kader van dit afstudeeronderzoek, en zullen daarmee *vertrouwelijk* worden behandeld.
- Na het interview wordt per e-mail een concept *uitwerking* toegestuurd aan de geïnterviewde, die daarop op- en aanmerkingen kan geven. De gecorrigeerde uitwerking wordt verwerkt in het eindrapport; de uitwerking zelf wordt niet opgenomen (in de publieke versie van dat rapport).
- Wanneer het onderzoek is afgerond krijgt de geïnterviewde (de publieke versie van) het rapport toegestuurd.

## Het interview

### Introductie (ca. 10 min)

- Kennismaking
- Toelichting verloop van het interview

### Mogelijke onderwerpen en vraagstukken (ca. 45 min)

- DBFM is overeenkomst lange termijn versus 'dynamische wereld'
  - Sociale waarde van een wijziging?
- Wijzigingsprocedure
  - Betrokkenheid van financiële instellingen in procedure?
  - Type wijzigingen wenselijk, en geaccepteerd?
  - Hoe staat een SPC daar over het algemeen in?
  - Hoe 'onderhandelen'?
- Gewenste flexibiliteit
  - Flexibiliteit belangrijk?
  - Hoe aandacht aan besteden in aanbesteding, en daarna?
- Mogelijkheden flexibiliteit van DBFM
- Risico's
  - Waardering van flexibiliteit?
  - (Transport)infrastructuur versus gebouwen
- Marktconformiteit wijzigingen
  - Transactie- versus directe kosten
- (...)

### Afsluiting (ca. 5 min)

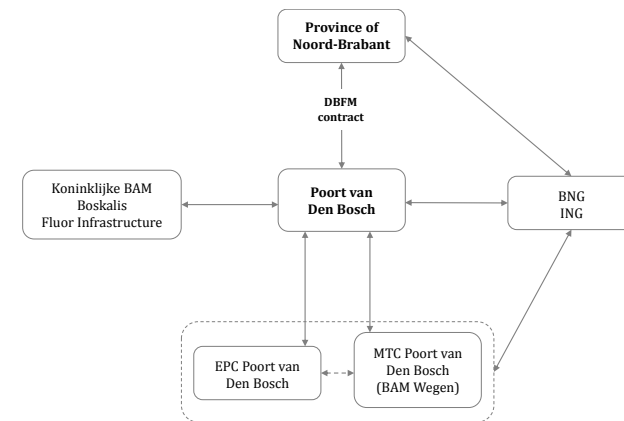
- Wat verder ter tafel komt
- Termijn voor verwerking van het interview & terugkoppeling
- Benaderbaar voor aanvullende vragen?
- Bedankt

## A5 Background information to the case projects

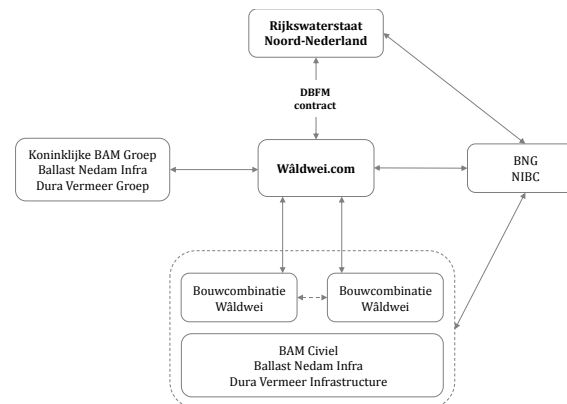
### A5.1 Organisation schemes DBFM case projects

In addition to the case description in sections 3.2 – 3.5 these organisation schemes are presented.

#### A5.1.1 A59 motorway

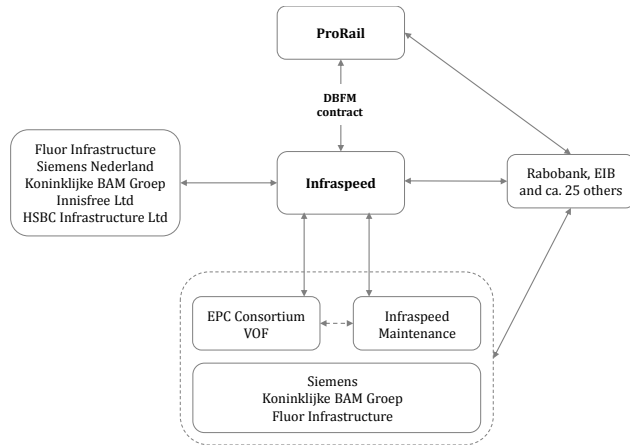


#### A5.1.2 N31 highway





### A5.1.3 HSL-Zuid



### A5.2 The change procedure of the HSL-Zuid project

The interview with the representative of Infrasppeed provided insight into the change procedure of the HSL-Zuid project. See Figure 29.



Figure 29 Change procedure of the HSL-Zuid DBFM project

## A6 Analysis of interests of the contracting parties & the financiers

In this research 8 interviews were held in phase 2a and 8 interviews were held in phase 2b as well. In these interviews the respondents expressed their meaning and their experiences towards the subjects that were brought into discussion. Those meanings and experiences have been 'translated' into interview elaborations, see the confidential appendix.

The tables in this appendix represent the meaning and the experiences of the respondents with respect to how they (and the organisation or company they represent) feel about changes and flexibility and how they (idem) assess change proposals. In other words: the tables are produced to create more generalised patterns of the respondents' interests and viewpoints towards changes.

Interests and viewpoints to changes	Client	Commissionee	EPC and MTC contractors	Financiers
	<p>No benefits for the Province in (making) changes, i.e. it has no interest in it. [Client A59]</p> <p>No interest of the Province to block communication between the commissionee and Rijkswaterstaat. [Commissionee A59]</p> <p>Task of the government (Province) is to serve road users, 'neighbours' in safety issues for example. The project result depends on it if it is delivered on time, which means a smooth handover to Rijkswaterstaat. [Client A59]</p> <p>For a client it is preferable to propose and make as few as possible changes. [Client A12]</p> <p>Changes should be assessed on their aggregated value (to society), not solely on if these are technically feasible for example. [Client A12]</p> <p>"The changing circumstance was that there was an unsafe situation..." [Client A12 about why it initiated a change]</p> <p>The client does rather not desire interfaces with new and/or other projects, as it does not prefer that a different contractor carries out additional works. [Client A12]</p> <p>"... the availability of the asset is important for ProRail..." [Client HSL-Zuid]</p> <p>The benefits of a change must outweigh the costs of it. [Client HSL-Zuid]</p> <p>Remain the contract's initial division of responsibilities in case of changes - "... the State should not incur extra risks from a proposed change..." [Client HSL-Zuid]</p>	<p>SPC</p> <p>"... the commissionee is not in favour of changes because it causes him to discuss it with his financier(s)..." [Client A59]</p> <p>With changes focus on not creating 'trouble' for themselves while cooperating in the change. [Commissionee A59]</p> <p>It is in the interest of the commissionee that an interface with another project is carried out in an optimal way, he therefore wants to carry out any assignment arising from interfaces. [Client A12]</p> <p>The financial incentive at milestones in the DBFM contract is too big to put it at risk with a change. [Commissionee A12]</p> <p>As this is his core business, for the commissionee in a way it is fair to make (for the client as little as possible) profit out of activities. [Client A12]</p> <p>"If there would be options in the contract, the commissionee will presumably offer a high(er) bid price, because he is unsure about a future risk..." [Client A59]</p> <p>"... in case of major changes? We maybe negotiate that the guarantee for the availability of the asset is reduced..." [Commissionee A59]</p> <p>"... measures on the overhead wires of the railway track causes extra risks on cracks of the wire and a safety risk in touching it..." [Client HSL-Zuid]</p> <p>"... the commissionee is in search of the highest price possible for a change..." [Client HSL-Zuid]</p>	<p>EPC and MTC contractors</p> <p>The MTC is to stand surety for the safety of the road users and thus interface with other project creates a risk on penalty points for example. [Commissionee N31]</p> <p>"... changes are not desirable for the commissionee (contractors) because these can have undesired side effects on performance of the rail..." [Client HSL]</p> <p>"... it is conflicting to operate what a different contractor has constructed..." [Commissionee N31]</p> <p>To "... be in power..." of the asset and to exert control over its quality - the commissionee wants to carry out changes itself as it is responsible for the asset. [Commissionee A59]</p> <p>Changes are turnover (in that respect change as much as possible). [Commissionee A59]</p> <p>Change is work (turnover). [Commissionee A12]</p> <p>A change for the commissionee is extra work with which money can be earned. [Client A12]</p> <p>Following the procedure rigidly does not fit with the EPC planning. [Commissionee A12]</p>	<p>Financiers</p> <p>Financiers assess the impact of changes on the risk profile of the project. [Client A12]</p> <p>Financiers need to protect their investment at the outset, because after contract close they have relatively few influence. [Commissionee A12]</p> <p>In case the contract parties wish to change the contract in whatever form, the financiers need to be involved as they want to make sure that the stipulations do not harm the cash flow. [Legal advisor A]</p> <p>Every form of flexibility is an insecurity that makes a DBFM project less attractive as a commodity (to invest in). [Legal advisor A]</p> <p>For the 'viability' of the project it is important that the contract parties follow the 'models' as accurately as possible. [Legal advisor A]</p> <p>One strategy of the financiers can be that after the realisation phase, when the project has become rather stable, they would like to buy out the shareholders in order to create an investment fund for private investors. [Financial advisor SPC B]</p> <p>"... above the threshold in the procedure the financiers have to approve the change..." [Commissionee HSL-Zuid]</p> <p>"... if the asset is not available, the income and therewith the financing of the project is at risk..." [Commissionee HSL-Zuid]</p> <p>Financiers "... do not accept a change..." [Legal advisor B]</p> <p>Financiers want to know the risks of changes. [Legal advisor B]</p>

Table 22 Interests of contracting parties and financiers from case study interviews (phase 2a) and phase 2b

Interests and viewpoints to changes	Client	Commissionee	SPC	EPC and MTC contractors	Financiers
	<p>"... the client <i>should</i> be aware of the fact that the commissionee wants to earn money with the project, (...) he should be aware that a change requires a compensation..." [Legal advisor A]</p> <p>"... both parties must be aware of the fact that if a change proposal is made by the one party, this requires a compensation from the other..." [Client]</p> <p>Rijkswaterstaat has the responsibility to react to wishes from society. [Client]</p> <p>Costs of changes must be demonstrable by the commissionee. [Client]</p> <p>Changes must be recorded in writing for the purpose of administration, for example for the <i>bevestigingsdienst</i> or for successors. [Client]</p> <p>"... because costs were too high the State decided to withdraw the change for the emergency lighting for the bridge that crosses the <i>Hollands Diep</i>..." [Commissionee HSL-Zuid]</p> <p>"... when the risks were mapped (more clearly) the State decided to withdraw the change for funding the rail on asphalt on sand..." [Commissionee HSL-Zuid]</p> <p>"... Infraspeed worked out an emergency plan for a tunnel but after assessing the impact analysis the State decided to withdraw the change..." [Commissionee HSL-Zuid]</p> <p>"... we assess the changes on their technical solution and on if the direct stakeholders [neighbours] are consulted..." [Rijkswaterstaat A12]</p> <p>"... we do not have project results in relation to the changes (...) but our general goals are traffic flow and safety..." [Rijkswaterstaat A12]</p>	<p>It is the responsibility of the commissionee to comply with rules and regulations, and so it will initiate changes if legislation changes. [Commissionee N31]</p> <p>"... the commissionee will particularly appeal to the change procedure if something disappoints – not if something turns out better than expected..." [Legal advisor A]</p> <p>"... both parties must be aware of the fact that if a change proposal is made by the one party, this requires a compensation from the other..." [Client]</p> <p>Changes must be recorded in writing for the purpose of administration, for example for the <i>bevestigingsdienst</i> or for successors. [Client]</p> <p>"... Infraspeed has to have approval of the global agent on the price of a change before that is communicated with the client..." [Commissionee HSL-Zuid]</p> <p>"... changes? If the State wants to, we have to..." [Commissionee HSL-Zuid]</p> <p>"... there is a very little chance that Infraspeed will propose more than 5 changes the coming 20 years..." – the 'system' functions and only if a change delivers a lot of additional value the change is accepted. [Commissionee HSL-Zuid]</p> <p>"... Infraspeed is obliged to follow the contract because it protects against risks..." [Commissionee HSL-Zuid]</p>	<p>In case of major changes the contractor(s) presumably place a request for reduced guarantees within the contract. [Commissionee A59]</p> <p>"... changes particularly in the realisation phase disturb the process... (...) ... leave the initiative for changes with the client, act reactive..." [Commissionee A12]</p> <p>"... the commissionee's contractor (in the realisation phase) is yet working on a change while this is not formally agreed upon yet..." [Client A12]</p> <p>"... another contractor in our scope? He will surely damage our works..." [Commissionee A12]</p> <p>"... handover of scope from one contractor to another is (always) an issue..." [Commissionee A12]</p> <p>"... one of the parties wants to guarantee the safety for 100%..." [Client HSL-Zuid]</p> <p>"... it is 'wasted' time [for the contractor] if we eventually reject the change proposal..." [Rijkswaterstaat A12]</p>	<p>Financiers have made agreements about the loan with <i>their</i> providers of capital – the "...adjoining redemption cannot be altered..." [Legal advisor B]</p> <p>A technical advisor advises the banks because "... a number of [technical] issues he does not understand about..." [Financial advisor]</p> <p>A bank wants to be sure that the money it has invested 'returns' over the lifetime of the project. [Financial advisor]</p> <p>For a financier a change influences the risk profile of the project and therewith the cash flow, and the efficiency gains. [Financial advisor]</p> <p>The cash flow is reduced if a change has to be paid from the OPEX by the commissionee, and this is less comfortable for a bank. [Financial advisor]</p> <p>Changes that incur an extra risk for the client are not an issue for the financiers. [Financial advisor]</p> <p>"... financiers are interested in the quality of the changes; (...) not only that the change is accommodated by the commissionee, but also <i>how</i>..." [Financial advisor]</p> <p>"... it is not the business model of the financiers to change the system constantly..." [Financial advisor]</p> <p>The technical advisor of the banks will assess whether the change complies with the (technical) specifications; whether the reimbursement is sufficient to cover the costs; and whether the SPC will have to incur a rest risk. [Financial advisor SPC A]</p>	

Table 23 Interests of contracting parties and financiers from case study interviews (phase 2') and phase 2<sup>b</sup> continued

Interests and Viewpoints to changes				
Client	Commissionee	EPC and MTC contractors	Financiers	
<p>"... the department of asset management of Rijkswaterstaat can propose optimisations of the asset, but this is not our [contract management] goal..." [Rijkswaterstaat A12]</p> <p>"...the client is not aware enough that the commissionee is confronted with a high degree of contractual complexity..." [Financial advisor SPC A]</p>	<p><b>SPC</b></p> <p>Infraspeed has 3 contractual grounds to reject a change proposal; if the change causes a dangerous or unsafe situation, if necessary permits are not issued, or if the financing is at risk. [Commissionee HSL-Zuid]</p> <p>Whether the change is paid by third parties, or by the State "... does not matter, as long as they pay us for it..." [Commissionee HSL-Zuid]</p> <p>"...one cannot seclude oneself from changes in the outside world..." [Commissionee HSL-Zuid]</p> <p>The goal of the SPC is to keep risks as low as possible – "it is a condition to obtain financing..." [SPC]</p> <p>"... the only risk Delfluent by has in the PPP <i>Harnischpolder</i> waste water treatment plant is to not send on the mail..." [SPC]</p> <p>"...the SPC is a kind of investment company..." [SPC]</p> <p>The SPC can only advise to reject a change because otherwise it would take on risks of the contractors. [SPC]</p> <p>"...the SPC is bound by hands and feet to the banks and is merely a 'service hatch'..." [SPC]</p> <p>"... the consortium has been too subservient in making changes in the past..." [Financial advisor SPC]</p>	<p>"... for the commissionee it is more expensive to get paid in terms than at once [in the case of a change] (...) the director of the SPC has a lot of tuss with the banks..." [Rijkswaterstaat A12]</p> <p>Because the contractors run the (construction) risks in the DBFM contract, they have to price a change, but can also indicate why they would reject a change. [SPC]</p> <p>"... one does not become 'rich' of changes in DBFM(O), nevertheless that is what the contractors (still) think..." [SPC]</p> <p>The interest of the contractors (and the SPC) is to accomplish the project timely, i.e. to meet the availability date. [SPC]</p>	<p>"... for the financiers it is comfortable that certain (well known) parties contribute to the private equity of the SPC..." [Financial advisor]</p> <p>"... it is very logical that the financiers restrict that the risk profile of the consortium is altered in the case of a change..." [Financial advisor SPC A]</p> <p>"... financiers can negotiate their risks in the tender phase, but if a change occurs that process starts all over again..." [Financial advisor SPC A]</p> <p>"... in general for us the PPP projects are [technically] too difficult and the volume of the private equity is too small..." [Institutional investor]</p> <p>An institutional investor is dependent on its technical advisor and possible other [technical] partners because it does not have the technical knowledge to assess the risks of a construction project. [Institutional investor]</p> <p>For the institutional investor it is important that as few risks as possible are allocated to the SPC. [Institutional investor]</p> <p>"... if extra financing is required for the change this is not an issue as long as the client compensates for it..." [Institutional investor]</p> <p>"... if the change is non-material or does not influence the availability fee, we are okay with the change have no 'interest' in it..." [Institutional investor]</p> <p>"... our viewpoint is quite financial: if the contract is watertight we merely present our desired yield..." [Institutional investor]</p> <p>"... we do not view flexibility of the contract with disavour, however everything has a price..." [Institutional investor]</p>	

Table 24 Interests of contracting parties and financiers from case study interviews (phase 2') and phase 2<sup>b</sup> continued

## A7 Analysis of time, costs, effort and performance of the DBFM change procedure

The following tables provide an aggregate overview of how satisfactory the changes and the change procedure are found by the involved contract parties. Both quotes and observations are included. These are derived from the interview drafts with the interviewees that can be found in a confidential appendix.

Client	Time	Costs	Effort	Performance
A59 Rosmalen - Geffen Province of Noord-Brabant	<p>The throughput time of changes is "ridiculously long.". The average is circa one year when realisation of the change is included.</p> <p>"... the procedure takes longer than necessary..."</p>	<p>The costs of changes do not directly play a role for the Province as these are paid by third parties – the principle is that the initiator pays.</p> <p>"The total costs of the changes are "...peanuts..."</p> <p>Prices can be (and are) checked on market conformity.</p>	<p>The initiator – mostly third parties – has to request the required permit(s) for the (realisation of the) change with Rijkswaterstaat itself, the Province does not do this.</p> <p>"... the change procedure is more complex due to several parties that have a saying..."</p> <p>It was observed that there is no(t much) 'negative energy' felt by the representatives in the procedure.</p> <p>There are no (actual) mutual tensions between the contract parties.</p> <p>"... the P of Partnership in PPP is very successful..."</p>	<p>The desired project result is to keep road users' neighbours etc. and Rijkswaterstaat satisfied.</p> <p>"... the Province is result oriented on if the project is delivered on time, i.e. a smooth handover to Rijkswaterstaat in 2020..."</p>
Commissione Poort van Den Bosch (PvDB)	<p>In some instances first an oral agreement was made, only then the change was formalised through the procedure.</p> <p>"... [we have] no issues with throughput times of procedure..."</p> <p>None of the changes was on the critical path – a change is urgent when it is on the critical path.</p>	<p>"... total costs are not much..."</p> <p>"... the principle is that the initiator pays..."</p> <p>Margins for profits and risks about 7% general cost 8%, exclusive of capital costs – "...very common figures..."</p> <p>3% overhead for SPC, also charged if the SPC has no share in the work.</p> <p>"... we do not have the illusion that we can ask (far) beyond real prices, as Rijkswaterstaat has a lot of parameters at its disposal..."</p>	<p>As the Province is not the asset owner, there is extra communication for the Poort van Den Bosch with Rijkswaterstaat – "...is not an issue, we are very flexible to that extent..."</p> <p>Decision on if NDW poles have to be constructed on the route was "...a lot of fuss and bother..."</p> <p>In some instances first an oral agreement was made, only then the change was formalised through the procedure.</p>	

Table 25 Viewpoint of client and commissionee towards aspects of the change procedure in the A59 project



Client	Time	Costs	Effort	Performance
N31 Leeuwarden - Nijega Rijkswaterstaat	<p>"...time and effort are no issues for us, because the contractor works out a change proposal..."</p> <p>"...some of the changes keep the company waiting..." which is particularly the case because some of the changes were bundled</p> <p>With the change <i>Haak om Leeuwarden</i> (HOL) new agreements must be made by the Bouwcombinatie and the HOL contractor but "...this takes a while because alignment of contractors is done on basis of ambiguous stipulations..."</p>	<p>Parties deviate from the contract when it comes down to the payment method of the changes, but "...either this method or the other does not matter for Rijkswaterstaat..."</p> <p>The price for the change of the Bouwcombinatie is compared with their own calculation. If the difference is beyond the bandwidth they discuss that.</p> <p>From the RAW method it is derived that the contractor can charge 3% profit margin, 4% general costs and some engineering costs.</p>	<p>In two weeks the team spends half a day on the DBFM contract, inclusive of the changes; "...this is not a lot of work..."</p> <p>There are no real discussions about the price of the changes; in preliminary consultation on the changes are discussed yet and the procedure is a matter of "...formally agreeing it..."</p> <p>The most recent change in the procedure is the bundled change "...to reduce the administrative burden of both parties..."</p>	<p>Changes do not always contribute to a particular goal and "...there is no particular goal defined..."</p> <p>"...general goals are traffic flows and safety..."</p>
Commissieonee Waldwei.com bv	<p>"...throughput times not always strictly followed, which does not always promote the progress of the process..."</p>	<p>The total costs of the changes are 0,25% of the original contract sum, which is €80 million of which €60 million realisation and €20 million maintenance.</p>	<p>"...during informal meetings issues are discussed that are not subject to the change procedure..."</p> <p>When there are interfaces with other projects the Bouwcombinatie is included in the preparation, "...[we] can co-think about suitable solutions..."</p>	<p>Project result is to "...obtain a positive financial result and to have constructive interaction between included parties and organisations..."</p>

Table 26 Viewpoint of client and commissieonee towards aspects of the change procedure in the N31 project

Client	Time	Costs	Effort	Performance
HSL-Zuid ProRail	<p>For one of the selected changes it took 4,5 years to conclude it, for others that have been initiated in 2009 no agreement is reached.</p> <p>Number of stakeholders influences the process; one change consequently has been a "...lengthy and painful process..."</p> <p>"...scope and price negotiations are per definition painful and lengthy..."</p> <p>Throughput times are not met and there are no sanctions so little pressure can be exerted.</p>	<p>Change for the AT stations was large in costs – a separate project organisation was erected.</p> <p>10% of the changes has a value below the (indexed) threshold of about €30,000.</p> <p>Many of the changes have cost above €1 million.</p> <p>Total costs of the changes are 1,5 - 2% of the original contract sum (€3 billion).</p> <p>Benefits of a change should outweigh the costs.</p> <p>"... change prices in a DBFM are never market conforming – the commissieonee has no concrete incentive to keep prices low..."</p> <p>In a DBFM parties are "...condemned to each other..." and the contract is a 'tommy' – prices cannot be regarded separate from their context.</p>	<p>Technical changes most 'difficult' because hard to point the origin due to many (technical) interfaces.</p> <p>Number of stakeholders influences the process; one change consequently has been a lengthy and painful process.</p> <p>As a member of the consortium Siemens is responsible for the ERTMS – "...consequently every change they want to test on safety..."</p> <p>Effort is laid in the throughput times of the change procedure – the internal procedure with Infrasppeed is lengthy because of negotiations with financiers and the non-availability of resources (personnel).</p>	<p>Changes are mostly initiated to increase or optimise performance of the rail.</p> <p>Project result assessed on scope, time, costs and value to passengers.</p> <p>To promote the interests of the State.</p> <p>Benefits of a change should outweigh the costs.</p>
Commissieonee Infrasppeed	<p>By any means Infrasppeed tries to comply with the throughput times – however in some cases, for example those that are technically complex, by mutual agreement they deviate from the contract.</p> <p>"... never are steps in the procedure skipped..."</p>	<p>The total costs of the changes (€47 million) are distorted by one major change, those of the AT stations.</p> <p>"...of course it is more expensive to process changes in a DBFM, because of all the side steps that have to be taken – financial cases and the involvement of the global agent..."</p> <p>According to the contract Infrasppeed should be paid for changes if 'necessary – moreover when the State withdraws a change after the variation impact report (in which also the costs are determined) the adjoining costs that Infrasppeed made are reimbursed by the State.</p>	<p>Compared to a change above the threshold, processing a small change is not a "...whole fuss for which many signatures are necessary..."</p> <p>There is on-going discussion on the point of the variation impact report – with the VIR a price indication is given by Infrasppeed according to the procedure, whereas the State actually desires a price before it initiates that particular change.</p> <p>The procedure provides for flexibility, however it "...requires a goal-oriented attitude of both contract parties..."</p> <p>For changing circumstances that are of influence on the HSL-Zuid that are outside the scope of the project no mechanism is foreseen, except for changing legislation.</p>	<p>"...a change of a mandatory document is not a change according to the change procedure as it is an update of such documents..."</p> <p>"... if the State wants to process a change, we have to..."</p> <p>"...Infrasppeed (and the State) cannot seclude one selves from changes in the 'outside world'..."</p>

Table 27 Viewpoint of client and commissieonee towards aspects of the change procedure in the HSL- Zuid project

Client	Time	Costs	Effort	Performance
Rijkswaterstaat	As for a software system it was unknown which version had to be applied, it was agreed that the commissioner should apply just one so as not to disturb the planning.  The change procedure is processed smoothly – changes are realistic and contract parties have the intention to speed up process.	Prices for changes are slightly higher than market prices, but costs are relatively low.  It is fair for the commissionee to make (for Rijkswaterstaat as little as possible) profit out of activities, because that is its core business .  The total costs of the changes in the maintenance phase compared to the total contract value (€260 million) is about 1%.	It depends on an organisation whether the process goes fast (how much pressure you put to it).  The commissionee's contractor is already working on the alteration while there is no official approval yet.  If one of the parties is hesitant for the change, he <i>might</i> be less willing to cooperate in accepting it and therewith the process can be found less smooth.  Whereas it contractually was not entitled to these, the Poort van Bunnik was granted some extra maintenance nights .  Many informal contact(s) (moments) in which issues are discussed.	The result is positive if costs are within €280 million and to create added value in several aspects.  Promote cooperation.  Represent third parties: example on placement of non-transparent barriers: Rijkswaterstaat proposed a change to meet a residents' request.
A12 Lunetten - Veenendaal	The change procedure has never been followed, process on basis of mutual trust.	No issue in costs, as so far Rijkswaterstaat has paid for these.		Changes should not disturb the process.

Table 28 Viewpoint of client and commissionee towards aspects of the change procedure in the A12 project

## A8 Appendix to chapter 6

### A8.1 DBFO projects for infrastructure in the United Kingdom

	Contract award	Commission	SPC
<b>Tranche 1 HA</b>			
A69 Newcastle – Carlisle	January 1996	84 km in total and construction of 3.5km by-pass	Road Link Ltd
A1(M) Alconbury-Peterborough	February 1996	21 km motorway widening	Road Management Services Ltd
A417/A419 Swindon-Gloucester	February 1996	52 km that includes 3 new sections of road	Road Management Services Ltd
M1-A1 Motorway Link	March 1996	30 km of new motorway, motorway widening and new interchange	Yorkshire Link Ltd
<b>Tranche 1A HA</b>			
A50/A564 Stoke-Derby Link	May 1996	30 km of new motorway, motorway widening and new interchange	Connect Ltd
A30/A35 Exeter–Bere Regis	July 1996	102 km in total; construction of 2 new sections and 9km bypass	Connect Ltd
M40 Denham-Warwick	October 1996	122 km motorway widening	UK Highways Ltd
A168/19 Dishforth-Tyne Tunnel	October 1996	118 km on line widening	Autolink Concessionaires (A19)
<b>Tranche 2 HA</b>			
A13 Thames Gateway*	April 2000	24 km on line upgrade and improvement schemes	Road Management Services Ltd
A1 Darrington-Dishforth	September 2002	22 km in total and construction of 2 new sections of motorway and communications	Road Management Services Ltd
<b>Tranche 3 HA</b>			
M25	May 2009	102 km widening and 400 km including operation and maintenance	Connect Plus
<b>Scotland</b>			
M6/A74	December 1996	90 km in total and construction of new sections of motorway and trunk road	Autolink Concessionaires (M6)
<b>Wales</b>			
A55 Llandegai-Holyhead	December 1998	50 km in total and construction of section of trunk road	UK Highways Ltd
<b>Local authorities</b>			
A130 (A12-A127)	October 1999	15 km in total and construction of section of trunk road	County Route
Newport Southern Distributor Road	June 2002	9,3 km in total including new river crossing	Morgan Vinci

Table 29 DBFO road projects UK (derived from Highways Agency date unknown; Shaoul, Stafford et al. date unknown:21)

## A8.2 (In)flexibility of the PFI contract

It is observed that inflexibility is one of the limitations of the PFI. However, it has both a positive and a negative side; the positive side being that the client has to think in the brief what it desires and expects from the asset. But contracts are per definition inflexible, because it is “a means to an end” which means that the contractual relationship between the parties is prescriptive.

The interviewees of EC Harris observed that from a financial point of view the lenders (financiers) charge money for the availability of funding even if the flexibility that is provided is not used. Particularly this is an issue with the current volatile market. As a consequence it is suggested that clients do not renegotiate their PFI's now, as banks are having small margins in the current contracts. If the contracts are 'broken open' the banks shall try to negotiate those margins, which most likely does not turn out in the benefit of the public sector.

Representatives of the Highways Agency noted that main issues with PFI now arise from the fact that during the recent financial and economic downturn interest rates are increased. Consequently the public sector can lend more cheap than the private sector and thus applying PFI is not a real advantage. However, from the interviewees it seems that benefits of PFI still outweigh the costs.

## A9 The PPS Werkt! conference 2013

### A9.1 The 'PPP works!' conference

The goal of this conference, which is organised by Rijkswaterstaat and the Rijksgebouwendienst, is to discuss PPP with the private sector “in a neutral, project-independent” setting. The theme of this year's conference is 'partnering and cooperation' and 'DBFM(O) and long term financing'.

The program was plenary in the morning. The general directors of the Rijksgebouwendienst and Rijkswaterstaat held short speeches and three Dutch PPP projects were discussed. In the afternoon there were workshops and a 'network' drink.

### A9.2 Feedback to flexibility of the DBFM contract

In his brief speech in the morning, Mr Jan Hendrik Dronkers, general director of Rijkswaterstaat said that he was curious about the topic of 'DBFM and flexibility'. In the afternoon a workshop was organised about it.

#### A9.2.1 Workshop 'DBFM and flexibility'

The workshop 'DBFM and flexibility' was facilitated by one employee of Rijkswaterstaat and one employee from PricewaterhouseCoopers. The facilitators presented **a framework for flexibility** in which the attendants of the workshops had to look for solutions or comments.

In the sub group, the emphasis lies on flexibility of the design and the design phase. The majority of this group (mostly employees from Rijkswaterstaat) agrees on the fact that flexibility should be engineered for at the outset of the DBFM(O) project. For example, that it should be a criterion in the EMAT.

However, the discussion about how the DBFM contract should effect a change in car use (the conversation is about a parking garage) is little coherent. The discussion gets stuck in that the participants agree on that flexibility is necessary, but nobody comes up with constructive arguments in how to incorporate flexibility. It was observed that **without a definition of flexibility** as commonly agreed upon, it makes less sense to discuss the topic.

Further, according to some of the Rijkswaterstaat employees the contract is 'good' with respect to flexibility, whereas some others are of the opinion that the change procedure is not 'good', which we will find out in future years. Though it is suggested that flexibility is expensive because it is a type of uncertainty, some participants think that financiers benefit from the optimisation that can be inherent to flexibility.

#### A9.2.2 Discussion about flexibility with attendants of the conference

It is observed that flexibility is a 'hot item'. Mr Dronkers said that “...the DBFM contract is a means to apply in complex situations, so there is a need for flexibility of it...”. However, “... it is not desirable to apply the DBFM contract to projects that are characterised by a stable environment...”.

Further, it was observed that the Dutch National Audit Office is publishing a report at 6 June 2013. It is about the contract management of DBFM(O) projects. (Mrs Ineke Boers)

Today the attendants of the conference emphasise that the contract is only an arrangement, and that it is equally important to create trust and understanding.

An employee of Rijkswaterstaat notes that flexibility is an issue for the PPC department. (Mr Caspar Boendermaker).

### A9.2.3 Poster PPS Werk! conference

The poster in Figure 30 was presented at Rijkswaterstaat's conference about PPP. It contains the conclusions and recommendations of this research at the time of the 'go/no go meeting'. Very little feedback was received regarding the conclusions and recommendations.

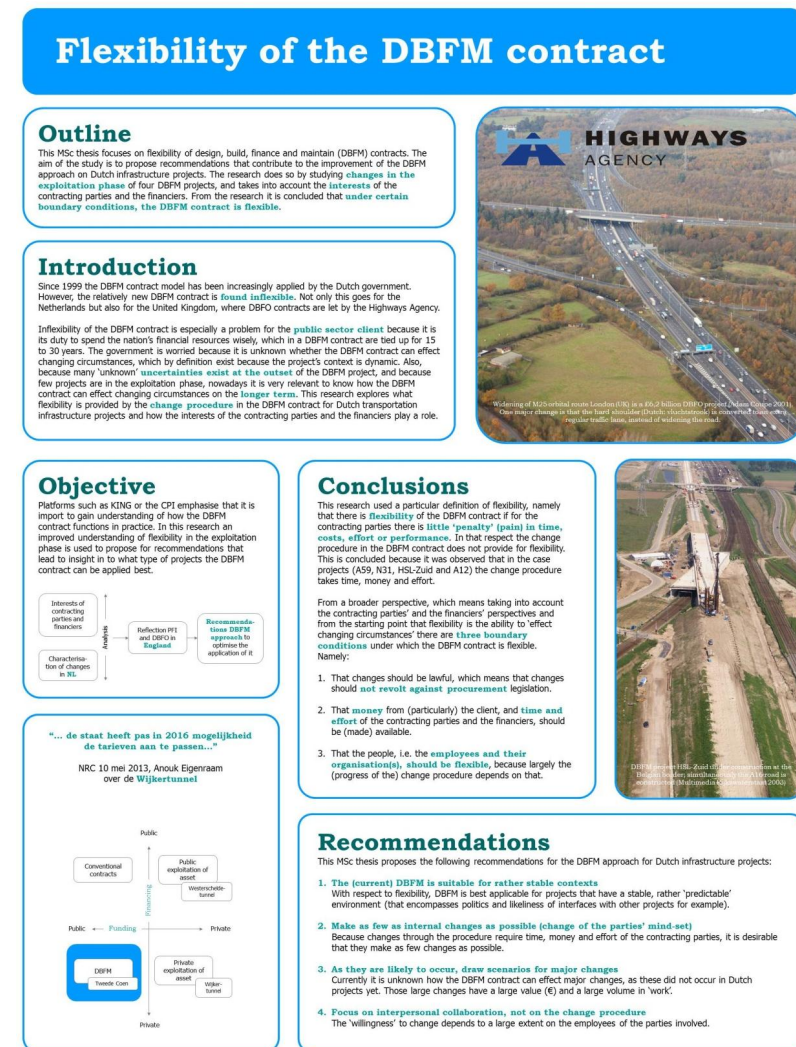


Figure 30 Poster PPS Werk! conference 30 May 2013

### A10 Personal reflection graduation project

From this research project, I can and *should* carry forward the lessons that I have learned. Therefore I divided those lessons in two categories. The first is about my personal process: how do I feel about doing research? The second category is about the project: how do I feel about the content of the research?

#### A10.1 My process

A researcher "operates relatively free and self-employed" and should be able to reach abstract goals such as creative, critical and independent thinking, as well as acting ethically and socially responsible, by applying very practical skills (Oost 2002c:7).

With respect to the above, the evidence that I can act independently is the trip to London, which I organised myself. Further, I know only few people who are as critically towards their own work as I am: it should be perfect. However, as a consequence creative thinking is suppressed, because I would like to be in control very much. Fortunately, in this project I learned 'to let go' the control, as that increases the quality and the fun in doing the research.

##### - Much time was needed to design the research

It is said that 25 – 30% of the available time for the research project is needed to prepare it properly (Oost and Markenhof 2002a:17). Indeed, I spent about 2 out of 8 months to it. However, I found this long and it made me nervous. However, in retrospect I am very glad that I spent much time on the research plan, which turned out to be solid and well-thought.

##### - There is much uncertainty in the early phases of research

At the outset of the project you do not know the problem statement exactly: you 'encircle' it. You compare it with the research objective, with the answers that you are looking for and with the central question of the research as well. This early stage of a research project is very uncertain, because often you rewrite the research plan time and time again. In doing this thesis, I learned to deal with this uncertainty (I survived).

##### - Most fun in having interviews and visit London

Thirdly, due to the fact that I am practical in nature I gained much energy from doing the interviews. It felt much more satisfied by telling my family that I did three interviews than to explain that I had 'thought' about a journal article. This is because the interviews generate tangible results: data.

##### - Research has no end

Finally, I have learned that a research is a never ending process. Due to the fact that only now I know what DBFM contract flexibility is about, I would like to go into related topics, such as comparing it with the flexibility of the DBM project. However, the trick was to scope this research and to keep it within time boundaries.

#### A10.2 My project

The following important lessons I have learned from doing research, from the viewpoint of 'flexibility of the DBFM contract' and how I designed the project.

##### - Flexibility is a (very) vague topic as it is a concept

In the literature study it was observed that flexibility is a concept, which means that in order to study a focus needs to be applied. Therefore the definition of Upton (1995) was introduced. Despite this definition, in one of the last meetings with my supervisors we



noticed that it was a challenge not to have confusion of tongues about 'flexibility', because:

- In daily use, everyone has its own perspective to 'flexibility'.
- Secondly, the definition that I used did not always match the 'daily use' of flexibility.

Therefore, in the interviews and meetings I had to employ the skill of putting the respondents' answers in the right perspective of flexibility. So, I constantly had to realise who was talking and from which viewpoint he was talking.

- **Advise: (briefly) test propositions before using them**

Four propositions were drawn in the literature study of this research, which I found very helpful for interpreting the qualitative data. However, whereas I thought the propositions were very self-evident when I concluded the literature study, I found them pretty particular when I used them to analyse the results.

I found out that such hypotheses should be reversible. For example, proposition I states that 'the more changes are made the more flexible the DBFM contract is'. However, what if only a little number of changes is made? Would that imply the DBFM contract is not flexible? As seen in the analysis of the propositions, the answer is 'no'.

Therefore, I advise any researcher to test its propositions (briefly) before using them in practice.

- **It is useful to discuss research with colleagues, friends, etc.**

Finally, for 'anchoring' the problem statement in the 'knowledge area' of DBFM I found it important and useful to discuss (parts of) the research throughout the project with colleagues, fellow students etc. Thereto, I organised a CME colloquium and held orientation interviews. I strongly recommend other researchers to reflect on their own work by discussing it with others, because it provides you with surprising and useful (new) insights.

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