



# Master thesis

Increasing flexibility throughout a planning lifecycle  
A focus on effects in contracts and tender phases

University of Groningen  
Carl von Ossietzky Universität Oldenburg  
Witteveen+Bos Consulting engineers

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Author(s) J.R.J. Wals BSc.  
Scientific supervisor dr. ir. W.L. Leendertse  
Second supervisor prof. dr. E.J.M.M. Arts  
Corporate supervisor ing. E. Schaft  
Peer reviewer dr. E.M. Trelle

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Address Witteveen+Bos Raadgevende ingenieurs B.V. | Heerenveen  
K.R. Poststraat 100-3  
P.O. Box 186  
8440 AD Heerenveen  
The Netherlands  
+31 (0)513 64 18 00  
www.witteveenbos.com  
CoC 38020751

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## PREFACE

This thesis marks the end of an era. An era that can predominantly be characterized by education and which has brought me figuratively to the farthest reaches of the water- and infrastructural sectors than interest me incessantly and literally to the complex and dynamic world these sectors intervene in. It brought me to, amongst others, Germany, where I lived and studied for a year, Iceland, the USA, the United Kingdom and Estonia and consequently obtained a broad scope on how these interesting issues occur differently in their various contexts.

During my studies and especially during my period within Witteveen+Bos, I explored that I have a special interest in civil engineering projects and, more specifically, for the contracting and procurement phases and subsequent realization.

Despite my own developments throughout the years, the completion of my studies and, more specifically, this thesis would not have been possible without the contributions, help and support of others. Therefore I take the opportunity here to thank those who have, in any sense, contributed to this result.

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With the finalization of this thesis various ways come together at an intersection. From here on I shall break new ground in my professional career in which I aim to develop myself towards a full and expert advisor in the arena of challenging and complex infrastructure developments and hence contribute to a transition towards more flexible and resilient infrastructure developments!

Jorian R.J. Wals

Winsum, 8 July 2016

## ABSTRACT

We live in an increasingly dynamic and uncertain society that at the same time is increasingly dependent on mobility and thus on our infrastructure systems. As a consequence, the Dutch have developed a comprehensive infrastructure system in the last few decades and, inevitable, developed an extensive degree of expertise and technical know-how in how to develop such infrastructures. But is retaining on this expertise and technical know-how sufficient to cope with increasing pressures and dynamics of society to further develop our infrastructures or are we to face a lock-in situation in which contemporary approaches are too rigid and insufficiently flexible? The core assumption within this research is that ultimate flexibility for contractors is supporting these contractors in offering and subsequent constructing of maximal efficient projects in terms of finances, applied knowledge and innovations. Therewith, it is increasingly adding value to the projects. The most important assumption however is that ultimate flexibility allows for adaptations of systems should their context or circumstances change over time.

In this research we investigated how we could increase flexibility throughout the planning lifecycle. Therefore we identified why and how flexibility is limited in contemporary infrastructure planning practice and how this could possibly be breached through. Theory revealed that within infrastructure planning practice three dominant, interconnected adjustment knobs can be distinguished in which involved actors can adjust the balance between robustness of a plan and the flexibility that is incorporated within the plans. These adjustment knobs are plan development, project formation and contract management. Via various interviews with clients, contractors and engineering consultants we retrieved that limitations to flexibility in contemporary practices are often rooted in some strict legal acts, the urge of civil servants to provide certainty to the local residents around that development and subsequent jurisprudence from Council of State once this certainty is not provided. These effects are reinforced by the often technocratic background of the actors involved in the process and a lack of mutual trust between clients and contractors.

Even though Dutch legislation generally allows for a larger degree of flexibility than current practices, often this occasion is not or not effectively used. Therefore we presented some proposals to break through this limited flexibility and therewith aim to increase flexibility throughout the planning lifecycle. In plan development documents the description and prescriptions of a particular project could be more functionally specified instead of solution-driven formulation. For project formation the concept of relational contracting is proposed wherein not only client and contractor are included but where stakeholders are incorporated too. In other words: a change in their role from stakeholder to shareholder of an intervention. Therewith, it is argued that they are more likely to embrace a larger degree of uncertainty and hence, more flexibility. With regard to contract management some different approaches of early market inclusion are proposed that are regarded as promising for increasing flexibility. Examples of these approaches are the construction team and plan-design-construct approaches. However, these proposals cannot be taken for granted and applied haphazardly; we also identified some issues that must be taken into consideration when aiming to increase flexibility. Generally these identified issues are very context dependent and must be seriously weighed before implementation. An important notion is, however, that these distinguished adjustment knobs are mutual dependent. Hence, interventions in the first stages of infrastructure development will influence the degree of flexibility and robustness in later stages of a project.

The research has resulted in a improved theoretical model which can help clients, contractors and consultants to: 1) easily identify which factors limits flexibility in specific phases of the planning lifecycle, 2) see which approaches could possibly break through these limitations or constraints and hence increase flexibility and 3) take note of the critical remarks with regard to these approaches and hence take consideration of the applicability of these approaches to the project at their stake. Therewith we have aimed to give a positive yet critical contribution to the discussions that currently takes place in the infrastructure development discourse on how to achieve and cope with increased adaptability. Thus we conclude that Dutch legislation allows for a larger degree than current practices and that the distinguished proposals of the framework are promising in achieving increased flexibility; albeit that these proposals cannot be taken for granted in every situation.

**Key words: infrastructure, contracting, flexibility, robustness, relational contracting, planning lifecycle, resilient infrastructure, Complex Adaptive Systems**



## LIST OF ABBREVIATIONS

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Abbreviation	Full
CASS	Complex Adaptive Social Systems
DRD	Draft Route Decision
EA	Environmental Act
EIA	Environmental Impact Assessment
EMI	Early Market Inclusion
EP	Environmental plan
ER	Environmental regulation
EV	Environmental vision
IA	Infrastructure Act
MIE	Ministry of Infrastructure and Environment
PEP	Provincial Environmental Plan
RD	Route Decision
RWS	Rijkswaterstaat
SMART	Specific, Measureable, Attainable, Realisable, Time-bounded
SV	Surroundings value

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## LIST OF TRANSLATIONS

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English	Dutch
Authorized supervision	Bevoegd gezag
Client	Opdrachtgever
Construction documents	Bestek (als in UAV)
Construction team	Bouwteam
Contractor	Aannemer
Counsel of State	Raad van State
Definite design	Definitief ontwerp
Environmental Act	Omgevingswet
Environmental plan	Omgevingsplan
Environmental vision	Omgevingsvisie
Infrastructure Act	Tracéwet
Preliminary design	Voorontwerp
Procurement directive	Aanbestedingswet
Provincial Environment Plan	Provinciaal Omgevingsplan
Realization design	Uitvoeringsontwerp
(Draft) Route Decision	(Ontwerp) Tracébesluit
Surroundings vision	Omgevingswaarde

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# 1 INTRODUCTION

Blueprint planning has long been gone in the Dutch planning arena. As a replacement, '[t]here is a growing trend in the Netherlands for outsourcing public construction activities through the use of integrated contracts' (Al-Jibouri & Ogink, 2009).

The processes within the Dutch planning lifecycle very often encompasses many years from the first initiation to final completion and maintenance. In this planning lifecycle, five main phases can be distinguished, each with its own legislation and habits (Visser, 2011). Historically, spatial intervention in the Dutch context starts with a *plan conceptualisation phase*. In this phase, as the name suggests, a plan is being initiated and conceptualized by interaction with stakeholders, eventually going through legal procedures and end with a preliminary sketch of the possible final situation. After finalizing this conceptualization phase, it is ready to be taken to the *development phase*. In this phase permits and legal procedures are further elaborated as well as developing preliminary- and final designs. Furthermore this plan development phase takes in the contract development and tendering of the contract.

To more or lesser extent are the three other phases that Visser (2011) distinguishes, being the *realization phase*, *operational phase* and the *deconstruction phase*, beyond the scope of this research. Although they will be further elaborated in chapter three, the focus of this research is predominantly on the plan conceptualization and plan development phase as well as on the contracting phase of a project. These three phases and the planning lifecycle will be further elaborated in chapter three. Initiatives to improve the process, for example by integrating the plan conceptualization phase with the plan development phase, have been analysed by many scholars (Arts & Sandee, 2005; Bijvoet, 2009). However, they appear to be both highly costly and difficult to implement (Bijvoet, 2009).

In their article, Brand & Gaffikin (2007) distinguish *visionary documents* and *implementation documents* in relation to the process addressed above. Visionary documents are characterized by a relative abstractness and a degree of creativity compared to implementation documents that tend to be merely concrete and final. An example of a visionary document in the Dutch context is the Provincial Environmental Plan (PEP) and the Route Decision (RD). It nevertheless appears that visionary documents incorporate some restrictive features which might obstruct creativity and flexibility in the plan development phase, and more specifically in contracting. In other words: the restrictive (or prescriptive) attitude that appears to be incorporated in visionary documents that are developed during the plan conceptualisation phases, constrains the flexibility in contracting and procurement phases.

The issue that has been sketched here is the main focus of this thesis. This thesis investigates how restrictive or prescriptive features in the plan conceptualization phase can be minimized and how these features affect, for instance by legislation, flexibility of the contracting and procurement phases of a project. Therefore solely focusing on the plan conceptualization phase is insufficient. Obviously it is important to focus on the plan development phase too. For instance, if the issues in the plan conceptualisation phase can be solved, how will this then affect the contracting- and tendering phase? And what is its relation to the Dutch Environmental Act and Infrastructure Act. In other words: this thesis follows a top-down pattern by firstly investigating improvements with regard to flexibility in plan- and project development and secondly explore the consequences of increased flexibility in contracting and procurement. Investigating these issues is not solely important to complete this thesis, moreover it is scientifically and societal relevant as will be further elaborated in the two next paragraphs.

Two main concepts that are often used in this thesis are 'flexibility' and 'robustness'. Although the concept of robustness is open to discussion and hence, inhibits various interpretations we here focus predominantly on the notion of 'robustness as proposed by Rauws et al. (2014) who argue that robust plans engenders the necessary levels of certainty to mobilize actors involved in the projects, to stimulate action and investment and to obtain stakeholder confidence. On a more abstract level we regard robustness as the 'strongness' of a

system and its subsequent capacity to coop with external pressures and internal stress of the system (Rauws et al. 2014). Flexibility, on the other hand, refers to the 'response to changes in the drivers of spatial development' that may occur during a planning lifecycle (Rauws et al. 2014) and hence, to the capacity to adapt. Flexibility thus implies that options and alternatives can be kept open until a decision is made later in a process. It therewith shows some clear resemblance with the conceptualisation of 'adaptability'. In this thesis the terms flexibility and adaptability are strongly interrelated. When we refer to the term flexibility, adaptability is incorporated within it.

## 1.1 Scientific relevance

One of the core issues within in the infrastructure planning discourse is the balance between rigidity, robustness, flexibility and fragility of development plans (Duit & Galaz, 2008; Rauws, Cook, & van Dijk, 2014). From a historical planning theoretical perspective, the planning discourse has always been a dichotomy between two extremes. 'soft' social sciences versus 'hard' natural sciences (Portugali, 2006) or Habermasian versus Foucauldian theorists (Flyvbjerg, 2001), Aristotle versus Plato (Roo & Voogd, 2004) and collaborative planning versus top-down decision making (Healey, 2003). The discourse of robustness and flexibility in development plans is just another set of two extremes that fit in this list. But, approaching them as extremes, not able to cooperate or coexist, is probably not contributing to the planning issues at stake. In other words: approaching them as parts of a spectrum allows planning theorists to rethink them and therefore enable them to coexist.

In order to achieve political and societal support, often a well defined, prescriptive development plan is demanded wherein one could nearly see the physical actions that will be undertaken. The demand of robustness is shaped by the wish of shareholders for solid and judicial guarantees for safety, durability and liability, enforced by decisive action by democratic legitimized authorities and clear, transparent decision rules (Rietveld et al., 2013). This is also stressed by (Omer, 2013) who states that '[r]obust systems are able to continue operation in their original form; that is, the structure of the system does not adapt to disruptions but withstands them'. On the other hand, increased robustness leaves little space for flexibility within a development plan. Flexibility asks for possibilities to adjust visionary documents like the PEP or the RD in order to have them less restrictive and prescriptive. Furthermore adjusting physical measures, in combination with the former, can initiate joint problem solving, collaborative dialogues and can initiate custom-made solutions or bottom-up initiatives (Rietveld et al., 2013). A flexible development plan accounts, however, less for its persuasive power and its visionary content, because the physical measures have yet not been determined. '[T]he general essence of flexibility is that it is the ability of the system to adapt to its environment due to unforeseen circumstances' (Omer, 2013).

Hence, the core issue of the robustness-flexibility bias is thus that compromising on the flexibility of a plan could possibly lead to more persuasive, visionary and concrete development plans with little space for adjustments. On the other hand, compromising on robustness could lead to more creative, adaptive plans with less convincing power or stability in the earlier stages of the development. (Rauws et al., 2014) argue therefore that 'visionary documents, which give plans persuasive value, should be considered at a strategic level [and that] in order to realize persuasive visions, concrete implementation measures are required at an operational level'. This implies a clear distinction between two types of plans: visionary, non-statutory plans and implementation plans, characterized by their statutory status (Brand & Gaffikin, 2007). The coexistence of these two types of plans might appear as a decent recommendation towards reduced imbalance between robustness and flexibility of development plans; it does however not provide any recommendation on *how* it should then solve this dichotomy. Although it will be further elaborated in paragraph 1.4 the latter must be considered as one of the core aims of this thesis.

## 1.2 Societal (corporate) relevance

In current planning practice, planning of infrastructure projects is a challenging task. All types of projects, including road infrastructure, railway systems and waterway projects face difficulties with time and budget overruns (Flyvbjerg, Holm, & Buhl, 2002; Haynes & Krmeneč, 1989; Cantarelli, 2011). Furthermore 'is the increasing scarcity of available space for land-use planning putting pressure on the available land' (Lenferink, 2013) and therewith contributing to the increasing complexity of the Dutch planning discourse. This

'increasing complexity in planning resulted in the traditional technical-rational planning approach failing to control the risks involved in projects' (Roo & Porter, 2007).

Increased flexibility is ought to be contributively and thus important to multiple key aspects of a project and plan development such as maximizing efficiency both financially and in time, applying knowledge and innovations from contractors in technique or process, achieving sustainability goals and most importantly allow for adaptation if circumstances throughout the process change and hence improving the quality of a infrastructural system.

To realize increased flexibility in plan and project development and in contracting and procurement, it is necessary to have a clear insight in why what has to be secured or captured in the development phases, for instance by legislation and how and where flexibility is possible, desirable or allowed. This is of particular importance for public clients such as provinces, municipalities, Rijkswaterstaat and private companies such as engineering consultancy companies and market party contractors. The importance for these organisations is based on the acknowledgement that they aim to maximize the efficiency and results of their contracts in project developments.

A core issue that can be directly derived from the first one is: how does increased flexibility in plan- and project development affect the contracting and procurement phases? If any current approach should be adjusted in order to successfully complete contracting and procurement phases, it is of importance for institutions or companies involved in these processes to gain some insight in how to adjust their procedures or focuses.

### 1.3 Aim of this research and research questions

This master thesis aims to investigate which and why restrictions or constraints are designed within the planning lifecycle and how these restrictions or constraints affect contracting and procurement. It therewith tries to solve the gap between robustness and flexibility of plan development. Therewith, this thesis also tries to bridge the gap between planning theory and planning practice by developing recommendations on how to increase flexibility without compromising on the robustness of plans. This thesis tries to achieve this by focussing on plan- and project development and subsequently investigates the consequences of increased flexibility for the contracting and procurement phases. This will be supported by an improved theoretical model.

This thesis concludes with statements on how more robust and flexible approaches can be achieved in plan- and project development and how this affects contracting and procurement phases. It therewith contributes to the discussion within the planning discourse on the robustness and flexibility of development plans and contracting. In the last section of this thesis some issues and features that could be considered for future research will be discussed, as well as some words with regard to the quality of the thesis and a reflection on the research that has been conducted.

In order to structure this research and to achieve the aims of this thesis a main research question has been designed. This main research question will be bolstered by sub-questions. Each sub-question takes different issues into consideration and will be handled separately. Acquiring insight in these sub-questions will eventually enforce the quality of the main research question. The main research question is directly derived from the issues mentioned afore in this chapter. Hence, the main research question of this master thesis is:

'How can increased robustness and flexibility be achieved within the plan- and project development of infrastructure projects and how does this affect the planning lifecycle?'

In an attempt to support this main research question the following sub-questions have been formulated:

1. What are constraints with regard to flexibility within the plan conceptualisation- and plan development phases?
2. What are motivations to incorporate limitations and constrains with regard to flexibility?

3. How can increased flexibility be achieved within plan- and project development whilst not compromising on robustness?
4. What are important considerations when applying strategies and approaches for increased flexibility and what are the effects on contracts and contracting strategies?

## 1.4 Research design

In this first chapter the key issues as a motive for this thesis have been addressed in combination with the scientific and societal or corporate relevance. Consequently the main research question and its supporting sub-questions have been proposed.

In the second chapter the research methods that will be used in this research will be discussed. In a general introduction to methodology in scientific research will be discussed and why it is relevant to use certain techniques within research. By doing this, this chapter aims to give a clear insight in how this research will be conducted and, more specifically, how for each research question an appropriate technique is designed to achieve a sufficient answer.

In chapter three a theoretical framework is developed that functions as the theoretical foundation for this research. In the theoretical framework selected topics within the infrastructure planning theme will be further elaborated. The theoretical framework aims to help acquire a clear understanding of the issues at stake within the arena of plan development and contracts and the interdependency of these issues. Therewith this framework will also elaborate the relevant Dutch planning legislation- and culture to obtain a clear understanding of the Dutch context in which this research is conducted. Subsequently the theoretical framework ends with a theoretical model that encompasses the features that have been elaborated in the theoretical framework. The theoretical model aims to visualize the relevant theories within the Dutch context. The theoretical model will therewith also be used in chapter 6 to compare the theoretical framework with the empirical results.

The empirical results are presented in chapters four and five of this thesis. The results are presented in a sequence that follows the research questions mentioned in chapter one and two. The results are retrieved by the methodology that has been presented in chapter two.

The results as presented in chapters four and five will be further discussed and reflected upon in chapter six. The quality and completeness of the data and its effect on the results will be discussed together with a reflection on how to improve future research.

Subsequently, chapter six deals with the conclusions of this research based on the results from chapter four and its discussion and reflection from chapter five. These conclusions will be visualised in a model that provides an answer to the research questions too. The conclusions will include a clear set of recommendations for clients, advising consultancy companies and contracting companies, based on the research that has been conducted in this thesis.

Chapter seven will reflect upon this thesis and the research that has been conducted. We discuss both the challenges that have been tamed successfully and the lessons to be learned. Chapter eight finally includes the list of references that have been used for this thesis. Appendices follow thereafter.

## 2 METHODOLOGY

In the previous chapter the motives and background for this research have been presented including the key issues and its subsequent research questions. This chapter discusses the research methodology and the research methods underlying this research. First, the qualitative research methods will be justified and it is discussed why qualitative research methods serve the purposes of this research better than quantitative methods. Furthermore the types of data collection are discussed. Consequently, it will also be discussed how the collected data have been analysed and how it is reflected in this research. In the last paragraph of this chapter some research ethics that could potentially have affected this research are discussed. In this paragraph it is also be explicated how we have dealt with these ethics during this research.

### 2.1 Qualitative research

Within the scientific context, one can distinguish roughly two types of research (O'Leary, 2014). First, quantitative research methods are traditionally characterized by a search for obvious truths, based on facts, variables and statistics and hence verified or falsified by hypothesis. As (Berg, 2009) mentions in his book, 'quantitative orientations are often given more respect'. This may also reflect the tendency by the general public to 'regard science as related to numbers and implying precision' (Berg, 2009). In contrast, qualitative research is not at all associated with numbers, fact and statistics that characterize quantitative research. Qualitative research is often associated with meanings, concepts and values. In an exertion to differentiate between quantitative and qualitative research methods Van Maanen, Dabbs, & Faulkner (1982) state that '[q]uantity refers to counts and measures of things' whereas '[q]uality refers to the meanings, concepts, definitions, characteristics and description of things'. Often, quantitative research is associated to the 'hard' natural sciences as qualitative research is associated to the 'soft' natural sciences which is at the core of the 'Science Wars' or 'clash of Schools' (Flyvbjerg, 2001; Saglam & Milanova, 2013).

As the planning discourse by definition takes place within the social sciences, so does the environmental and infrastructure planning. Therefore, within the research design, qualitative research methods prevail over quantitative methods. Quantitative methods have some clear limitations that can be captured by using qualitative methods. Except from the Dutch legal framework (which will be elaborated in chapter three), it is not the aim of this research to have an objective, value free description of the concepts and topics that will be investigated. Nor can they be transferred into numerical data or statistics. It is likely that in an attempt to collect data via questionnaires, a lack of in-depth analysis will be revealed. A second argument for neglecting quantitative research methods is the unavailability of databases that contains the relevant information needed for this research. Therefore, qualitative research methods remained.

The type of research question implies that qualitative research methods are the most suitable for this type of research because a sufficient answer to this type of question demands an in-depth analysis of various views towards this question. Quantitative research methods are regarded insufficient in-depth to give a full answer to this type of research question. Despite the statement of O'Leary (2014) that shortcomings of qualitative research methods could possibly be bridged by quantitative methods, this research will solely focus on qualitative research methods. Qualitative research methods 'aim at a holistic view of phenomena and more often [than quantitative methods] deploys an inductive, exploratory approach' (Saglam & Milanova, 2013). Furthermore, qualitative research methods follow a flexible, open-ended and circular process in order to initiate a dynamic view on the phenomena at stake. When taking into consideration the aim and scope of this research, one could easily conclude that qualitative research methods suit this type of research the best.

Within qualitative research, multiple techniques are developed to conduct an in-depth research in an attempt to shape a holistic view on phenomena. Some of these techniques include structured interviews, semi-structured interviews, focus group discussions and literature analysis (Saglam & Milanova, 2013). The next paragraph will explicate the methods that are used in this research and argue why these particular types of data collection have been chosen. We have not chosen to conduct a case study for this research. Although a case study could have shed an interesting light over the practical application of the issues addressed in this

thesis it would also demand some additional efforts (including a timeframe) which was unavailable to sufficiently integrate a good case study. Nevertheless, we highly recommend studying the practical application of this thesis in future research.

## 2.2 Data collection: methods of research

For this research, predominantly three different types of research methods have been used. In this paragraph these three types will be further explicated.

### 2.2.1 Literature analysis

Literature analysis is marked by Davies & Dwyer (2007) as the backbone method of qualitative research in geography, despite the increasing popularity of other methods. In this research, this method has predominantly been used to elaborate the topics of the theoretical framework. The literature analysis is conducted through intensive searching for (predominantly in online libraries and reference lists of other articles) and reading of (scientific) books and articles regarding the distinguished topics in the theoretical framework. From this broad range of literature, a selection of information, based on an analysis of scientific and practical relevance, has been collected in an attempt to create a holistic overview of the topic at stake and consequently giving insight in the academic discussion that surround the topics. Eventually have views and arguments of different scholars a place within this framework.

### 2.2.2 Interviews

In an attempt to answer the research question and its forthcoming sub questions, interviews have been conducted throughout this research. The selection of the interviewees was predominantly based on the background of these experts (public client, contractor and consulting engineering), their relation to and experience with the issues of this research and their willingness and ability to participate in an interview. Within the field of conducting interviews, Opdenakker (2006) names various techniques of interviewing such as face-to-face interviews, telephone interviews and interviews by e-mail. In this specific research the interviews have been conducted as a narrative in a face-to-face setting. According to Opdenakker (2006), face-to-face interviews can be characterized by synchronous communication in time and place. Hence, the main advantage for this research method is the recognition of social cues such as voice and intonation. These are advantages that no other type of interviewing has and is therefore beneficial to this research (Opdenakker, 2006).

Another key advantage of face-to-face interviews that have been mentioned by, amongst others, Opdenakker (2006) are the reduced probability of significant time delay between question and answer. The probability of this risk in other types of interviewing is much higher. Despite these two advantages Opdenakker (2006) identifies a constraint for face-to-face interviews. The interviewer must concentrate more on the questions to be asked and the given answers, but this disadvantage is less prominent in the narrative setting our interviews were conducted in.

As Gill, Stewart, Treasure, & Chadwick (2008) state: '[t]here are three fundamental types of research interviews: structured, semi-structured and unstructured'. Structured interviews are in their essence not more than verbally administered questionnaires, where a list of predetermined questions is followed and where no additional questions can be conducted (Gill et al., 2008). In sharp contrast is the unstructured interview. Unstructured interviews 'do not reflect any preconceived theories or ideas and are performed with little or no organization' (Gill et al., 2008). Unstructured interviews generally start with a single question which initiates further discussion that consequently follows as the final result of the interview. The interviews for this particular research however have been conducted in a narrative, semi-structured setting. That is, a protocol has been developed in preparation of the interview which has been sent to the interviewee in advance. It contains a list of several key questions which helps to define the areas to be explored. Therewith, the interviewee can prepare the interview too. It enables the interviewee to develop more in-depth answers than in an ad-hoc situation (Gill et al., 2008). It is exactly this type of in-depth answers that contributes to the quality of this research. A semi-structured, narrative interview also implies some space for extensions of answers and additional questions (Gill et al., 2008). This is beneficial for this research as the interview might reveal that some additional questions or information is necessary. Another key argument for choosing this particular type of interviewing is that the flexibility of this approach allows for the discovery or elaboration of

information that is important to participant but that has not previously been thought of or proposed by the researcher. The protocols used for the interviews are attached to this thesis in appendix IV. Due to the Dutch scope of this thesis and the arterial language of all participants in the interviews, the protocols and the transcripts of the interviews have been developed in Dutch.

The interviews are recorded, with permission of the interviewees to facilitate subsequent processing, coding and analysing (see also paragraph 2.3).

### 2.2.3 Focus groups

Comparable to the methodology that has been elaborated above, data have also been collected via a focus group session. Although focus groups share many common features with unstructured and semi-structured interviews it should not be regarded as collecting data from many participants at once (Gill et al., 2008). Focus group sessions merely aim to generate an understanding on collective views and participants' experiences and beliefs. It therewith is also useful for discussing particular topics that can be disputable or unclear amongst participants.

For this research, experts in the field are interviewed. For some specific topics however, it was also useful to have focus group discussions with multiple participants. The experts who have been identified primarily consist of experts employed at Witteveen+Bos and other consultancy firms, contract managers and project leaders from market party contractors and project leaders from clients such as Rijkswaterstaat, provinces and municipalities. The selection of participants of the focus group session was based on their professional background (public client, contractor, consulting engineering), their relation to the field of study and their willingness and ability to participate in the focus group session. It is more challenging to arrange a focus group session than conducting individual interviews, due to increased complexity in personal schedules, commuting distance and prevailing obligations of participants. Limiting the amount of participants in the focus group sessions and the duration of the session itself increases the probability of finding a convenient date for all participants.

The focus group session was led by the corporate supervisor. The moderator and participants of this session have been provided with a guideline to (semi-)structure the session. This guideline also consists of a list with topics to be discussed. The topics on this list first, move, like Stewart & Shamdasani (2015) suggest, from general to more specific questions and second, follow a sequence that follows the importance to the discussion. This helps the moderator to structure the session and enables him to start a new discussion on a different topic once the previous discussion divagates from its key issue. The guidelines have been attached to this thesis in appendix IV. Consequently, the moderator initiates interaction between the participants and ensures that anyone can contribute to the discussion and involves those who tend to fall by the wayside.

Interviews and focus groups remain the most common methods of data collection in qualitative research (Gill et al., 2008). This combination of methods is ought to be sufficient to collect the desired information with regarded to the predefined research question. Both the interviews and the focus group session are characterized by a narrative and semi-structured organization. Protocols and guidelines to organize the interviews and focus group session have been predefined to enable interviewers, interviewees, moderators and participants to prepare the interviews and focus group session.

This research started with conducting six key interviews with experts in the field, to get a first overview of information available. Interviews have been conducted with experts from clients, two with civil contractors and two with advisory engineers. Based on these interviews and its forthcoming preliminary results and conclusions a focus group session and further interviews were organized. This second round of data collection is based on the protocols and questions that were developed earlier, but incorporate the information and results of the first round of data collection too.

The interviews and the focus group session are recorded, with permission of all the participants to facilitate subsequent processing and analyzing (see also paragraph 2.3).

## 2.3 Data analysis

To process and analyse the data that were collected during the interviews and focus group session, multiple tools have been used. As mentioned above, the interviews and focus group session were recorded. Two tools were used to 1) process the information that has been collected and 2) analyse the collected and processed information. Both the tools will be discussed hereunder.

### 2.3.1 F4 transcript

F4 transcript is software that supports researchers in transcribing their audio content. The tool is particularly useful to process audio content that, like this research, was collected via interviews and focus groups as it enables the processor to assign participants to the discussion which becomes visible in the transcription. Furthermore, F4 transcript is very user friendly as it rewinds the audio for a few seconds after the pause is terminated and does it show which sentence has been spoken at which time. This makes it easier for the researcher to find the right time span if he wants to listen the audio file back, see figure 1. The output file of the F4 transcript software is in Microsoft Word and is thus usable for other purposes. In this research the output file is used to analyse the data. This is further elaborated hereunder.

### 2.3.2 MAXQDA

MaxQDA is a text analysis software program. 'Responses to open-ended questions from survey research can be imported in the program, demographic variables and categorized survey responses can be associated with text documents in a MAXQDA project' (Maietta, 2008). The transcription, as an output file from F4 Transcript, is imported in MAXQDA. The strength of the software is furthermore that it enables researchers to code segments of these documents and 'counts of those segments are available throughout an analysis' (Maietta, 2008). Therewith this software program can be used to add value to coded segments which enables the research to quantify the qualitative analysis and hence derive statistical information.

## 2.4 Research ethics

In this paragraph the position of the research within this research will be discussed. Being aware of one's own position and reflexivity is of crucial importance within every research as this leads to a better understanding from research participants (Hennink *et al*, 2010).

As mentioned afore, for this research multiple interviews and a focus group session were conducted. It is not in the scope of this research to retrieve any sensitive information and thus no vulnerable ethic circumstances were expected. Nevertheless, interviewees were given the possibility to anonymously participate in the interview. This possibility was also offered in the focus group session. Therewith counts that if at least one participant wished to participate anonymous, the entire transcription of that session was made anonymous. Those who have not anonymously participated were asked to approve the content of the content of their part before publishing.

Appendix I contains a consent form that has been filled in by all participants in the data collection process. It is a written agreement on the collection and subsequent processing and publishing of collected information. Furthermore, this form contains information with regard to the anonymity of a participant and his or hers wish to receive an example of the published thesis. The filled-in forms have been kept private during this research and will be destroyed after publication of this thesis.

# 3

## THEORETICAL FRAMEWORK

Thorough scientific research is impossible without a decent theoretical foundation. In this chapter we will discuss the theories that are applicable to the research we conduct. First, we will elaborate upon the Dutch infrastructure planning arena and therewith give insights about the historical background of the Dutch planning culture and current practices. Thereafter, we discuss literature with regard to the different stages within plan development and subsequent argue for a 'planning lifecycle' approach throughout this research. In paragraph 3.3 we introduce the theory of Complex Adaptive Social Systems and the desire to change. Complex Adaptive Social Systems are here regarded as the dynamic and volatile society that instigates change and development of infrastructure networks. Their drive for change and development is however affected by robustness and flexibility discourses which will be presented in paragraph 3.4 To investigate how theories may work out in the Dutch context it is important to take notion of Dutch legislation. Therefore we elaborate upon the Environmental Act and the Route Decision Act; the two most prominent acts that affect infrastructure development. In paragraph 3.7 we shortly address scientific literature with regard to contracting and partnering before we present our theoretical model in the last paragraph, 3.8. In this theoretical model we combine the various theories that are presented throughout chapter 3 and hence identify three adjustment knobs that can influence the degree of flexibility and robustness throughout the planning lifecycle. Therewith this theoretical framework functions as a sound basis to test our empirical results.

### 3.1 Setting the stage: the Dutch infrastructure planning context

The relatively small space that The Netherlands encompasses in combination with a high population density has put enormous pressure on land use throughout the history of The Netherlands. Hence, The Netherlands has a firm tradition in planning bolstered by a robust legal framework in which planning has a considerable role (Hajer & Zonneveld, 2000). In The Netherlands, the Ministry of Infrastructure and Environment is responsible for the planning of the main road, waterways and railroad infrastructure. The Ministry of Infrastructure and Environment is supported by an executive organization, Rijkswaterstaat (RWS). RWS is, amongst other issues, responsible for planning, design, construction, management and maintenance off rail, road and water related infrastructure of national importance.

The Dutch planning system is a legislative rather than a political system, which embrace protection and legal certainty (Jansen-Jansen & Woltjer, 2010). Although the majority of infrastructural projects in The Netherlands are initiated by public actors as RWS, provinces or municipalities, private and civil actors participate in such processes (van der Valk, 2002). The Dutch planning culture, characterised by the belief in consensus building, is predominantly reflected in comprehensive plans for a geographical area. These plans are 'subsequently embodied in a development plan and thereby formalized and carefully followed through to completion'. This nevertheless implies that the potential to negotiate the scope and substance of developments is reduced as the project progresses (Jansen-Jansen & Woltjer, 2010).

In this chapter some main theoretical backgrounds with regard to the (Dutch) planning culture are presented. Firstly we approach planning as a lifecycle in which one can distinguish different phases and stages of project development. It will become clear which of these phases and stages are important for this research. Thereafter, we will elaborate the robustness and flexibility discussion and present some theoretical recommendation on how flexibility can be incorporated in project development.

The core assumption in this research is that one would ideally keep a planning stage as flexible as possible and therewith not obstructing contracting in a later stage in the planning lifecycle. Keeping stages flexible is desirable as then adaptation to dynamics remains possible. The contract is then finally formed within the boundaries of the planning and the project stages. But, as we shall see in this chapter, here appears to be a gap. A completely open planning phase tends to be inhibited by legislation, subsequently affecting flexibility in contracting. For large infrastructural interventions a public route determination (eventual with an environmental impact assessment) has to be completed. After a Route Decision, 'only marginal deviations

from that Route Decision are allowed during the procurement procedure and the subsequent construction' (Lenferink et al, 2012). In other words: in the planning stages the boundaries of the projects are determined whereas in the contracting stage the flexibility within these boundaries is further restricted. To gain more insight in how flexibility is restricted in the Dutch infrastructure planning context we will further elaborate the Dutch legal framework, focussing primarily on Environmental Act (EA) and Infrastructure Act (IA).

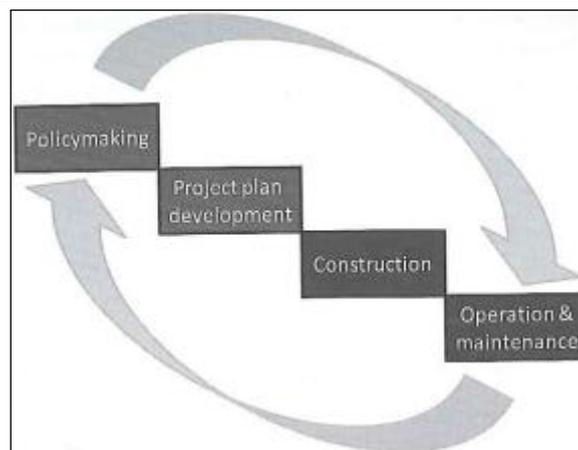
The last paragraph of this theoretical framework presents Dutch contract- and procurement procedures and shortly introduces the initial experiences with parallelizing the plan development processes and procurement stages. We will conclude this theoretical framework with a theoretical model that will be used further within this research.

### 3.2 Planning lifecycle

Dutch infrastructure planning at a national level can traditionally be characterized as a rather linear and top-down approach (Lenferink, 2013; Van der Heijden, 1996). As mentioned before in chapter one, blueprint planning in the Dutch context is long been gone as planners abandoned the idea that hierarchical structure with top-down approach could solve planning issues (Dryzek, 1993). The development that Woltjer (2000) describes from *technical rationale planning* towards a *communicative, interaction-oriented planning* in the 1990s is supporting the view of Al-Jibouri and Ogink (2009) that '[t]here is a growing trend in the Netherlands for outsourcing public construction activities through the use of integrated contracts'. Hence, Lenferink (2013) describes current Dutch infrastructure planning process as a lifecycle based on several phases. The planning lifecycle refers to the notion that planning of infrastructures in a continuous process which, after commencement, runs through different stages and at some point end, after which the cycle starts again. Lenferink (2013) distinguishes the phases *policy making*, *project plan development*, *construction* and *operation and maintenance*. Having insight in these phases is of particular importance because they strongly guide and structure the Dutch infrastructure planning.

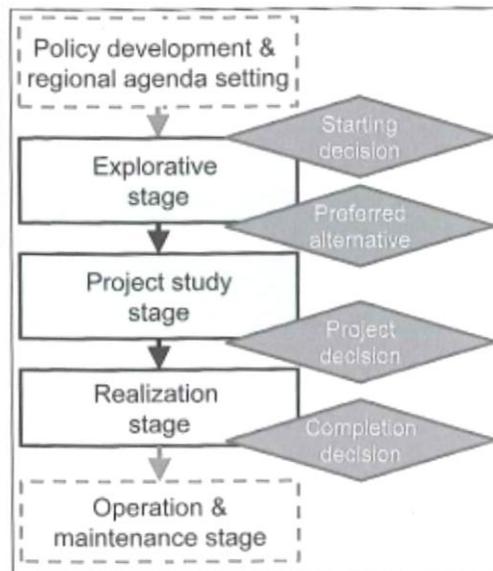
Lenferink (2013) visualises this planning lifecycle as shown in figure 3.1. The phases within this lifecycle are realised through so called MIRT processes. This 'staged planning process functions as the basis for the planning of main infrastructure and is the formal legal anchor point for infrastructure planning' (Lenferink, 2013). The MIRT project book is an annually edited book in which the Ministry of Infrastructure and Environment publishes their policies regarding infrastructure investments.

Figure 3.1 Dutch infrastructure planning lifecycle (Lenferink, 2013)



The policy making phase is followed by the project plan development phase. This phase, also often referred to as the plan conceptualization phase, is the factual first commencement of a project. Within this project planning, some important stages and key decision are distinguished, as can be seen in figure 3.2 (Lenferink, 2013).

Figure 3.2 Stages and key decisions in project plan development (Lenferink, 2013)



In the explorative stage the usefulness and necessity of projects are explored, potential solutions are investigated and eventually the appropriate scope of the project is determined. Consequently, this explorative stage helps the stakeholders to decide upon a preferred alternative (Lenferink, 2013).

For the research at stake it is particularly the project study phase that we focus on, because we expect that the key motivations for limited flexibility are rooted in this phase. In this phase, the preferred alternative is further investigated in terms of preliminary designs, the size of the investment involved and planning procedures such as *zoning* or *environmental impact assessments* are being followed. At the end of the phase this results in a final decision, such as a Route Decision. 'This final planning consent is the basis for the procurement and the resulting contracts with contractors' (Lenferink, 2013). It are precisely these planning procedures and following procurement and contracts that we further investigate in this research.

After procurement is finalized and the contracts with contractors are signed, the product study stage is followed by respectively the realization or physical construction of the project and operation and maintenance of the object.

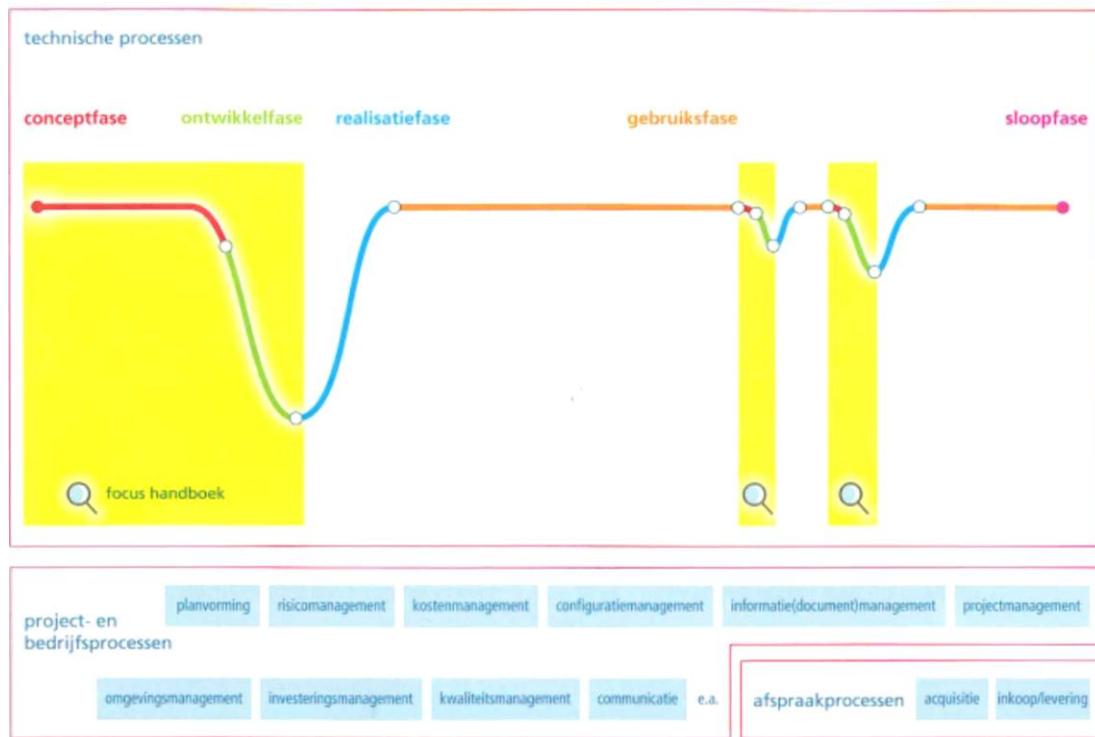
Other scholars like Visser (2011) however, approach the planning lifecycle differently. Figure 3.3 shows that Visser (2011) neglects policy making as a step within the planning lifecycle. Thus, the planning lifecycle here starts with the concept phase in which, similar to Lenferink's planning lifecycle, potential solutions are investigated, planning procedures are started, the scope of the project is determined and the preferred alternative is decided upon. This is fluently followed up by the *development phase*. In this development phase the planning procedures are finalized, preliminary designs are drawn and the contract development and public procurement processes are initiated.

The lifecycles are similar in distinguishing a *project conceptualisation phase*, subsequently followed by a *project development phase* (Lenferink, 2013). The actions and products within these steps are similar too as is the acknowledgement that the conceptualisation- and development phases must be finalized before a *realisation phase* is started, although (Lenferink, 2013) refers to this as the *construction phase*. It nevertheless appears that the realisation phase and construction phase are identical. Furthermore are the distinguished phases after realization identical in the maintenance and operation phases.

The two planning lifecycles differ too. As mentioned before, Visser (2011) does not take policy making into consideration. It is augmented that this is beyond the scope of an actual project as it merely concentrates on a program or political decision making. The more comprehensive scope of Lenferink (2013) and the rather

practical attitude of Visser (2011) book make it plausible that policy making is not taken into consideration in figure 3.3. The more comprehensive attitude of Lenferink (2013) could also be an explanation for his more in-depth elaboration on steps within the conceptualization- and development phases (see figure 3.2).

Figure 3.3 Planning lifecycle (Visser, 2011)



### 3.3 Complex Adaptive Social Systems and the desire to change

Now that we have presented the stages in the planning lifecycle the question arises where demands for development originate from. Therefore, we focus on the conceptualisation of Complex Adaptive Social Systems (CASS). CASS are social systems that 'evolve and display new and emergent properties and self-organizing behaviour of their components' (Williams, 2011, p. 1034). CASS are based on the satisfaction of the most basic needs, and flexible, frequent and open communication and interaction but can also 'yield complex and unpredictable outcome' (Williams, 2011, p. 1034). The system we focus on consists of all the actors involved in planning, projects and contracting, as well as the civilians in the vicinity of the intervention. The process that connects these actors are (1) planning, (2) project management and (3) contract management (see also figures 3.4 and 3.9). It is a layered and interconnected system; the interconnection between the layers determines the capacity to adapt and every layer filters the dynamic surroundings of the system. In figure 3.4 we distinguish four different layers that have a role in the functioning of the system. The first layer is the dynamic surroundings of the system, regarded as a CASS, for whom a need for adaptation to changing circumstances is necessary. This necessary change is the root of proposed interventions, albeit that the CASS is 'characterized by apparently complex behaviours that emerge as a result of often non-linear spatial-temporal interactions among a large number of component systems at different levels of organisation' (Chan, 2001). These necessities can emerge due to bottlenecks in infrastructure, room for improvements or because adaption to changing circumstances is demanded.

To structure the volatile need for adaption of the system to changing circumstances, the proposed intervention is transferred into a planning phase. This planning is characterized by the development of a rather abstract demand into a more structured and concrete plan which makes it easier to grasp a bit of the proposed intervention. Subsequently changes this planning phase into a project, being more concrete and further binding agreements on the proposed intervention being made. Finally this project develops a contract which binds the contractor to construct the proposed intervention (developed from the desire for change) according to the requirements of the contract. In this situation the volatility of the proposed intervention gradually diminishes and hence increasing robustness and constraining flexibility see figure 3.4.

In an ideal situation however, one would increase robustness without compromising on flexibility as the dotted line in figure 3.4 suggests. In other words: the root of the problem is that the adaptive capacity of a system reduces as the processes evolve over time (i.e. due to funnelling and concrete plans), but the surrounding of the systems remains even dynamic.

Figure 3.4 Dynamics and flexibility throughout different project layers

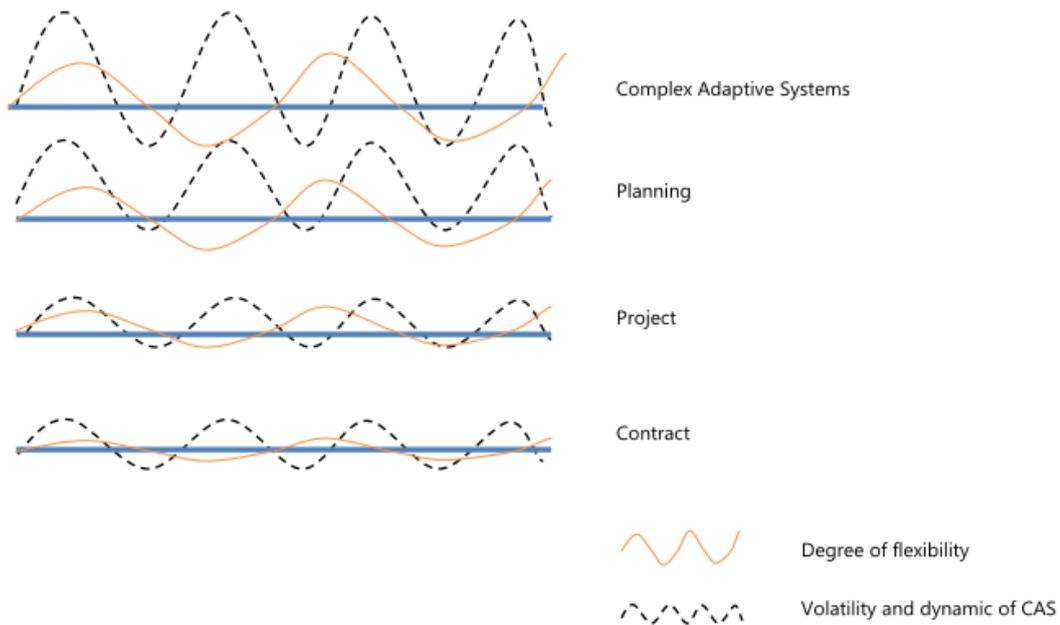


Figure 3.4 shows that within CASS the surrounding of our system are highly dynamic. This demands for flexibility. The sum of this flexibility is often lower than the dynamic surrounding of our CASS which subsequently creates tensions. The adaptive capacity of our system is instigated by the interaction between the three layers: planning, project management and contract management. Planning is only partially coping with these dynamics and is partially passing it on to the project management layer. The same pattern occurs for the dynamics between project management and contract management. An important notion here is, however, that the balance between the dynamics being passed on and the degree of flexibility in the subsequent layer must be proportionally. If there is an imbalance this creates tensions in the dynamic of the surrounding of the CASS. Thus, the flexibility and the dynamics of the surrounding is being distributed between the layers.

Projects are funnelled via the processes that are described in paragraph 3.2 and as a consequence, the degree of flexibility reduces. This reduced flexibility must be captured in the planning layer. The challenge there is the search for increased space in project management which, subsequently, demands increased flexibility in contracts and thus, contract management.

The identification of the demands for adaption to changing circumstances, rooted from CASS, and its subsequent steps with according degrees of flexibility and dynamics allows for a further exploration of the discourse between this flexibility and dynamics and the interrelated discourse between flexibility and robustness. The next paragraph elaborates how robustness and flexibility interplay and why both are important though challenging to coexist.

### 3.4 Development plans; a robustness and flexibility discourse

Project conceptualisation- and development phases are central in the planning lifecycle because they 'create a vision on how places should develop and prescribe how desired patterns of development will be realized' (Rauws et al., 2014). However, the issue is that the products that are produced within the conceptualisation-

and development phases of the planning lifecycle are increasingly regarded as inflexible and even rigid when the context or circumstances of a project change (Rauws et al., 2014).

To gain insight in this issue it is important to first outline which products are developed within these phases of the planning lifecycle. Secondly we will elaborate how these products can be characterized and third how to overcome the issue that Rauws et al. (2014) mention in their article.

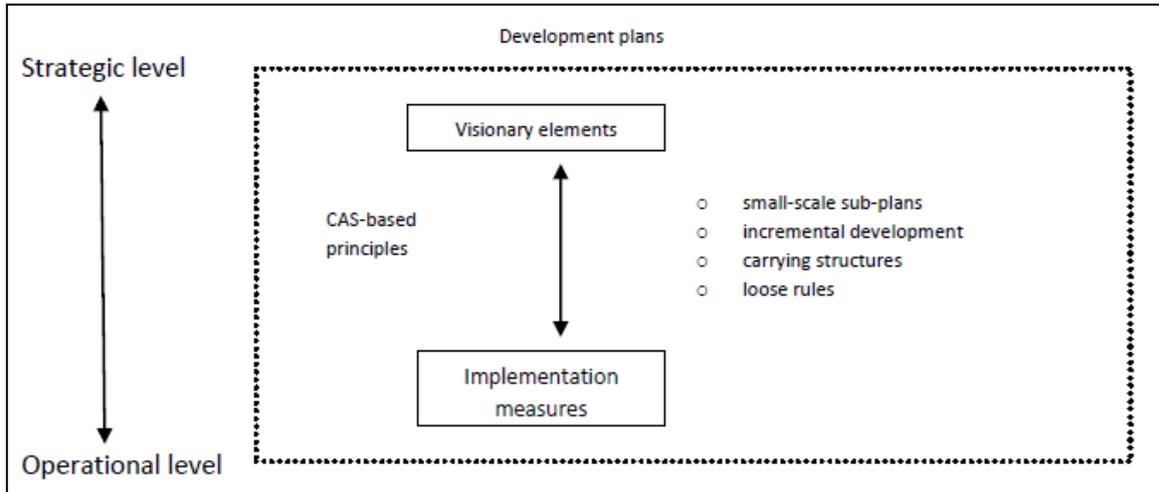
As described in chapter 3.2, within plan development two main phases can be distinguished, each with their own processes and products. The products that have to be developed for a sufficient plan development is recorded in the Infrastructure Act (van Zundert, 2014). This Infrastructure Act demands that the explorative stage (see figure 3.2) investigates the possible solutions to the issue at stake. In this explorative stage, information is gathered regarding the area, the core issue of the problem and relevant spatial developments that subsequently result in a few possible alternatives. Within the explorative stage stakeholders are involved through for example consultation sessions or information meetings (van Zundert, 2014). The phase results in one or more elaborated alternatives, supported with documents that visualize the presented solutions. The alternatives are considered amongst stakeholders and result the choice of an preferred alternative.

The preferred alternative is further developed in the Draft Route Decision. This Draft Route Decision contains sketches of the final situation as a solution to the issue at stake. Furthermore, it contains preliminary designs and an estimation of costs. Within this Draft Route Decision also an Environmental Impact Assessment is included (van Zundert, 2014). This Environmental Impact Assessment elaborates the expected effects of the Draft Route decision on the environment.

After completion of the Draft Route Decision including an objection period, the project is being referred to as Route Decision. Once this stage has been achieved, the respective clients RWS or province has to take care for the realisation of the project. Therefore they grant the relevant zoning permission and eventual other relevant permission (Boonman et al, 2011).

As stated above specific processes must be followed in order to comply to the Infrastructure Act. The plans and documents that are developed throughout these processes must be robust to achieve the level of certainty necessary to convince involved actors such as project developers, citizens and local politics. Rauws et al. (2014) argue, however, that development plans increasingly tend to be rigid rather than robust. But 'the underlying drivers of spatial development, such as technical innovation, socio-economic changes and lifestyle trends, and also local demands and capacities, frequently transform spatial configurations more quickly than development plans assume'. In other words: during the continuous processes of the conceptualization- and development phases important circumstances regarding the issue might change to a degree the planning is not able to adapt to. Hence, conceptualization- and development processes in infrastructure planning are characterized as rigid in contrast to the dynamic contexts of this planning (Rauws et al., 2014). Furthermore, it is argued that the rigidity of these phases discourages further spatial innovation by contractors and hence more flexibility is demanded to provide infrastructural developments with the capacity to mediate and respond to changed circumstances (Alfasi, 2006; Rauws et al., 2014; Staley & Claeys, 2005). This reinforces the demand for incorporated flexibility within the conceptualisation- and development plans.

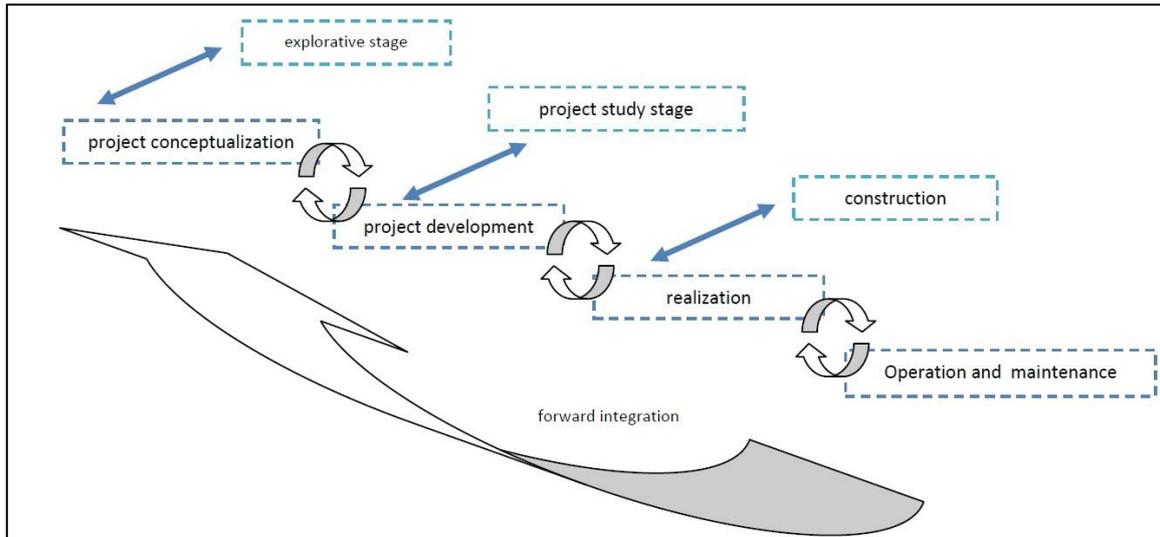
Figure 3.5 Framework for flexible development plans (Rauws et al., 2014)



In figure 3.5, Rauws et al (2014) present some practical suggestions to increase flexibility in the conceptualisation and development phases of projects. The first suggestion that is made here is that of the subdivision of overarching projects into multiple independent smaller scale projects. Large scale projects have a long-term span in which changing circumstances (at all levels) are more like to occur than in projects with a significant shorter time span. To reduce the likelihood of changing circumstances, assuming that this contributes to rigidity of a project, it is preferable to implement multiple smaller projects rather than a single overarching intervention in which fundamental uncertainty is inherent (Alfasi & Portugali, 2004). Smaller scale projects which cover a relatively short period make them less vulnerable to contextual changes.

The application of incremental development strategies could furthermore contribute to more flexible and robust project developments. Such as strategy would, according to Rauws et al (2014), involve the design of development plans that incorporate or acknowledge a path dependent development. Lenferink (2013) refers to this path dependency as the continuous process with *feedback loops*, of which figure 3.6 is derived. What this figure shows is that after completion of each step within the planning lifecycle the undertaken actions and processes are evaluated and reflected upon and feedback is provided by the involved stakeholders. Thus, an incremental development strategy is created where after each phase or stage adjustment to changed circumstances or contextual trends is possible when needed. Connecting these stages furthermore stimulates involvement of different actors from other stages and therewith creating opportunities for learning and feedback loops (Lenferink, 2013).

Figure 3.6 Feedback loops model (own, based on Lenferink (2013) and Visser (2011))



The third notion from Rauws et al (2014) is to infrastructure planning by and large rather odd. Their third suggestion to increased flexibility touches upon the development of *carrying structures* such as road and public transport networks, blue-green networks or data networks (Rauws et al., 2014). Indeed, infrastructure projects in the sense of road- and water infrastructures in itself are huge carrying structures. Thus the argument of increasing flexibility through the construction of carrying structures is not applicable to the scope of this research and will hence not be further considered within this thesis.

The fourth recommendation with regard to increasing flexibility in conceptualisation- and development phases is simplifying and loosening rules, rather than maintaining detailed regulations and requirements (Rauws et al., 2014). Subsequently should this result in an ample amount of flexibility for actors to adjust the project to changed circumstances or contextual trends when necessary (Lynch, 1987). Although Rauws et al (2014) propose ‘a set of basic, general and often qualitative rules defined within a development plan to guide development [...]’, one can easily see similarities with the shift from object-oriented specified requirements towards more function-oriented specified requirements when contracts are drawn up. Loosened rules aim not to cover all possible alternatives or prescribe a specific way of construction as they rather focus on creativity and innovation from contractors (Alfasi & Portugali, 2007).

A final notion of key importance that Rauws et al (2014) make is that ‘it should be recognized that the degree of flexibility embodied in a project is not predetermined by natural laws but is the result of choices made by key actors’. Although this notion seems legit, it is interesting to investigate what then actually is determined by natural laws and legislation. As a consequence it is important to investigate how legislative determinations constrain flexibility. In the next paragraph we will outline the most relevant legislations to infrastructure planning: the Environmental Act and Infrastructure Act.

### 3.5 Environmental Act

The Environmental Act (EA) is one of the larger new legislation in the Netherlands in recent years. The EA touches upon the physical environment and therewith on both natural environments (water, soil and air) and the human activities build within them such as buildings, roads and waterways (Vos, 2014). Hence, this law is applicable to activities that may affect the physical environment such as the construction of a housing block, constructive works within a major channel as well as the development of a nature conservation area.

Two generic aims of the EA are further translated into four focal points. First, the EA aims to *protect* the quality of the current physical environment. It considers the preservation or increasing of environmental and spatial qualities. The second aim considers *utilizing, controlling, interlarding and developing* of the human physical environment (Vos, 2014). As mentioned above, these two aims are made more useful by translating them into four focal points.

The first focal point is the simplification of regulations in combination with an increased usability. This will be achieved by combining multiple Acts into one overarching Act and harmonizing regulations but also by increasing accessibility and visibility of these regulations, for example via IT solutions such as apps and websites. This focal point obviously shows some resemblance with the suggestion of Rauws et al (2014) to loosen regulations to increase flexibility. The second focal point of the EA is to effectuate a cohesive approach towards the physical environment. It does nevertheless not imply that all plans should contain an integrative attitude. The EA leaves space to consider either a sectoral approach or an integrative one. No matter which approach one chooses, the EA legislation is able to facilitate that decision. The focus point nevertheless remains intact. As a third focal point is stimulating to actively achieve environmental goals. The EA therefore embraces not solely classic instruments such as permitting and supervising but also a programmatic approach for specific local circumstances (Vos, 2014). In other words, the EA allows administrative freedom and flexibility to enable specific local approaches. The fourth and last focal point within the EA is to accelerate decision making of projects. This focal point is based on an approach of early inclusion of stakeholders to achieve active participation but with concentrated decision making (Vos, 2014).

The EA features a number of tools which can be used to achieve the goals of the Act. They will be shortly introduced hereafter before the most important tools for this research will be further elaborated. The *Environmental Vision* (EV) is as relatively broad and integrative a document which encompasses the ambitions of (de-)central governments for the physical environment. However it is a strategic long term document (Vos, 2014). A second instrument is the *program* and contains a more concrete set of measures. Certain programs are obligatory to sectors within nature, water and infrastructure and have to be related to existing plans and programs within these sectors. Another tool that the EA features is the *Surroundings Value* (SV). Within this tool, governments set goals to achieve desired qualities with regard to (parts of the) physical environment at a predefined point in time. From this SV the obligation to monitor is derived. This obligation states that when monitoring shows that predefined qualities tend to be neglected, measurements have to be undertaken to curve that tendency (Vos, 2014). Furthermore are in the *Environmental Regulation* (ER) at a provincial level and the *Environmental Plan* (EP) at municipality level rules, regulations and goals bundled to which interventions in the physical environment have to fulfil (Vos, 2014). The most important feature of the EA to this research is the *Project Decision*. A project decision encompasses most of the regulations from the Infrastructure Act<sup>1</sup>, the Spatial Planning Act<sup>2</sup> and the Water Act<sup>3</sup>. This project decision is applied in infrastructure development plans such as the construction, diversion or reinforcement of primary water defensive structures, road- and energy infrastructures (Vos, 2014). The project decision incorporates early inclusion of citizens, non-governmental organisations and relevant administrative bodies (Ministerie van Infrastructuur en Milieu, 2013). This broad exploration demands an early investigation of usefulness and necessity of a project and should hence lead to qualitative improvements in decision making and increased political and societal support. The latter thus implies increased robustness in plan development. The main advantage of this feature within the EA is that the project decision not longer has to be followed up by adjustments in the EP as the project decision adjust these issues directly (Vos, 2014). Hence, this project decision simplifies regulations, supports a programmatic approach and subsequently speeds up project development. As a consequence this new feature fulfils three out of four focal points that we distinguished above.

The procedure with regard to a project decision consists of six steps. The steps can be visualised in a model like figure 3.6. What becomes clear is that they show clear resemblance with models of the planning lifecycle that have been discussed in the previous paragraph, see figures 3.1, 3.2 and 3.3.

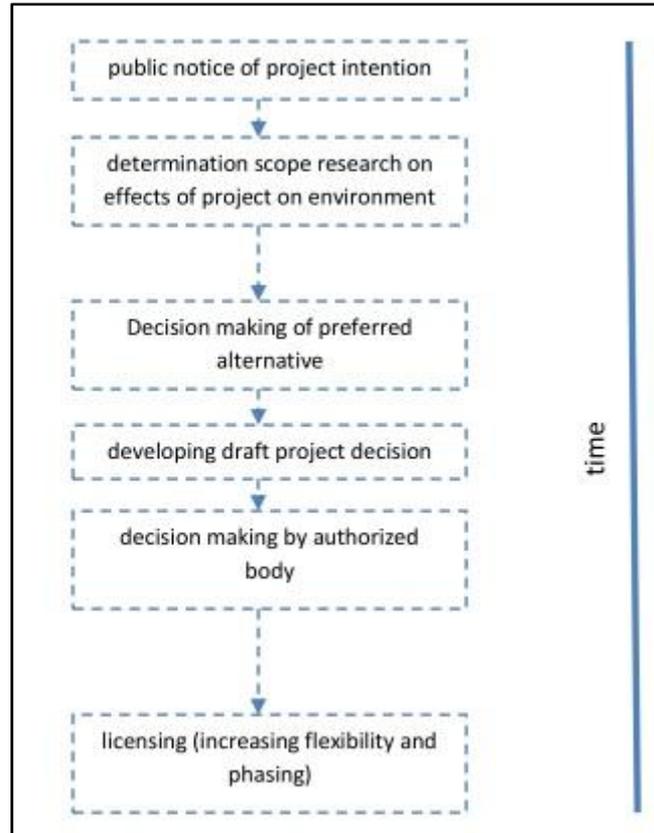
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<sup>1</sup> Tracéwet (1993, 16 september); accessed on april 13, 2016 via <http://wetten.overheid.nl/BWBR0006147/2015-01-01>

<sup>2</sup> Wet Ruimtelijke Ordening (2006, 20 oktober); accessed on april 13, 2016 via <http://wetten.overheid.nl/BWBR0020449/2016-04-14>

<sup>3</sup> Waterwet (2009, 29 januari); accessed on april 13, 2016 via <http://wetten.overheid.nl/BWBR0025458/2016-07-01>

Figure 3.7 Steps within a project decision (own model)



The presented models are based on the various Acts we discussed and thus, show clear resemblance with each other. The steps within these models are hence an integral part of the planning lifecycle. A notion that is especially important to this research is the timescale in figure 3.7. As in project practice it is more convenient to apply for technical licences at a later stage than the project decision (Ministerie van Infrastructuur en Milieu, 2013) this leads to a relatively long timeframe between these two steps. This allows for increased flexibility and phasing of the project more easily. This increased flexibility is incorporated within the EA and therewith allows for specific local measures (Vos, 2014). How these flexibility tools are incorporated within the EA will be discussed hereafter.

As the flexibility tools are legally framed within the EA, their functionality and recognisability is guaranteed. A first regulation that is included in the EA is the role of customized rules and regulations. These customized rules and regulations that initiate locally specific approaches have the same status as general applicable rules and regulations (Vos, 2014; de Graaf & Tolsma, 2014). As a consequence the EA offers potentially a broadly applicable ability to deviate from standard regulations and to determine to which extent deviation is allowed. The customized rules and regulations must be defined within the environmental plans, water board regulations or provincial regulations but, nevertheless, offer a change to make locally specific approach possible. In the EA's predecessors there was hardly any room for locally specific approaches and if there was, there status was subordinate to general rules and regulations. An important notion from De Graaf & Tolsma (2014) is however that deviation from general rules and regulations does not imply that this specific set of rules and regulations is less strict than the law requires in general.

The regulation with regard to *equality* principle offers contractors and citizens to comply with the EA with other measures than traditional or conservative measures. Contractors and citizens can apply for such permission to the legislator. The regulation states that different measures are allowed if the results of those measures are equal or better than the results of traditional measures and complies with all other applicable laws. The burden of proof for such measures remains with the applicant of the permission. Although the term 'measures' can in itself be somewhat prescriptive it is important to note that herewith not solely physical interventions or techniques are meant but that (working-)processes are incorporated too (de Graaf

& Tolsma, 2014). Hence, this regulation stimulates innovation and creativity from contractors. Besides this apparent increased flexibility in the EA there is also some criticism on this equality principle. On the basis of national uniformity in the assessment of *equality* there is still room for improvements. The law provides no indications yet how the definition and assessment of *equality* can be secured (de Graaf & Tolsma, 2014).

A third regulation to facilitate flexibility within the EA is the *experimental clause*. This experimental clause allows that temporary deviation on applicable regulations is allowed and is meant to facilitate future developments, techniques and practices in which the existing legislation does not provide (de Graaf & Tolsma, 2014). Like the equality regulation, this clause stimulates innovation and creativity from contractors. The difference between the two is that the former, the equality regulation, is not allowed to deviate from current regulations and the experimental clause is allowed to deviate. To control this clause, the duration of the deviation has to be determined in advance. Furthermore must the deviations that are allowed after completion of the experiment have to be predetermined, in combination with a monitoring- and evaluating plan (Vos, 2014; de Graaf & Tolsma, 2014). Also with regard to this flexibility tool some criticism has arisen. The Council of State (in Dutch: Raad van State) and De Graaf and Tolsma (2014) argue that the criteria to which a new proposal should be assigned as an *experiment* are yet not clear enough which can subsequently lead to less clear and predictable legislation.

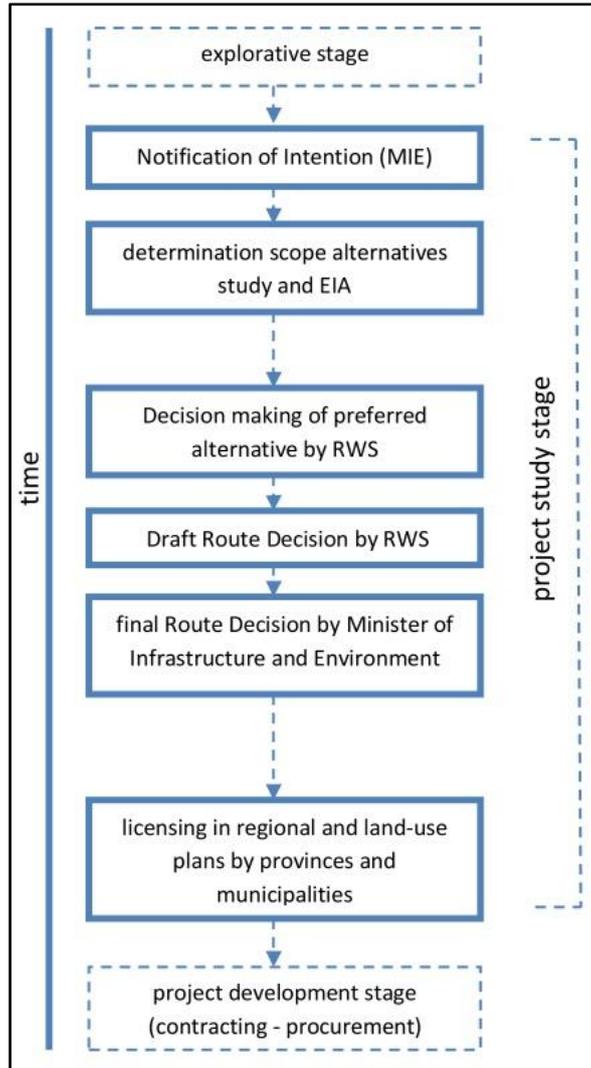
### 3.6 Route Decision Act

The Route Decision Act (RDA) is a procedural act on which decisions are based with regard to large and medium-sized infrastructural interventions (Gierveld, 2007). It is a legal procedure that has to be undertaken to support the factual construction of major infrastructural projects. This procedure generally takes place after a *project exploration stage* (see figure 3.2). Therefore the Route Decision Procedure is in this research regarded as part of the *project study stage*, prior to project realisation.

The initiating institution, mostly the Ministry of Infrastructure and Environment (MIE) or RWS, takes care of the majority of the tasks that are related to this RDA. A part of the tasks, predominantly engineering, designing, environmental impact assessment studies and contracting phases are regularly outsourced to consultancy companies. The procedure for achieving a final Route Decision can be characterized by four major steps. The procedure commences with the MIE publishing a Notification of Intent. The Notification of Intent outlines the project in general and broadly sketches the proposed development that has resulted from the explorative stage in the plan conceptualisation phase (see figure 3.2.) It furthermore determines the scope of the Environmental Impact Assessment (EIA) (Lenferink et al, 2012). Secondly, the MIE prepares a preliminary design for the proposed intervention. The project at large and the forthcoming possible alternative routes are further investigated with regard to their external interfaces and (environmental) impact. The third step in this procedure is to select a preferred alternative after consultation rounds and further investigation. This preferred alternative is then further worked out in greater detail and is referred to as the Draft Route Decision. This further elaboration of the Draft Route Decision is generally executed by RWS. Fourth and last decides the Minister of Infrastructure and Environment upon a final decision, the Route Decision, after which the relevant decentralised governmental bodies are obliged to 'include the route into their regional and land-use plans'. (Lenferink et al, 2012).

When taking this into consideration, we can redevelop figure 3.7, subsequently making it more comprehensive. This improved figure can then thus be visualised in figure 3.8.

Figure 3.8 Improved project decision model - Route Decision



As figure 3.8 suggests, the contracting (or procurement) procedure only starts after the project study stage has successfully been completed and has subsequently led to a final Route Decision that 'provides consent and sets the framework for the procurement procedure' (Lenferink et al, 2012). After a Route Decision only minor deviation from this Route Decision and its proposed construction is allowed, because the Route Decision is based on a wide consultation assessment among stakeholders with regard to, amongst other things, (environmental) impacts. A broad deviation from the Route Decision could potentially lead to waning political and societal support and a failure to comply with agreements.

This small room for contractors to deviate from the Route Decision is regarded as inflexible. '[I]mprovements can be made only with regard to technical details at an operational level' (Lenferink, 2012). Examples of such details are project phasing, engineering and quality of materials and applied techniques. The spatial design of the proposed intervention remains broadly intact. Hence, this traditional approach constrains flexibility and as such innovation and creativity from private contractors. This tending constraint flexibility in project development is reinforced by the acknowledgement that the traditional Route Decision procedure is a very time consuming approach, as several alternatives have to be investigated and multiple environmental impacts have to be assessed. As a consequence, the time between first stocktaking of an issue and the commencement of the contracting phase may take multiple years. Years in which the specific circumstances of that issue may have changed drastically but nevertheless have at some point, due to the Environmental Act or the Route Decision Act, been nailed down.

### 3.7 Contracting and partnering

Several scholars have aimed to overcome inflexibility in the Route Decision by early market inclusion (EMI) (Lenferink et al, 2012; Arts & Sandee, 2005; Bijvoet, 2009; Mosey, 2009). In essence, EMI aims at involving contractors in contracting processes before the Route Decision has been finalized. In general two approaches are distinguished to apply EMI. *Parallelization* takes place before the project study stage is started and, as the name suggests, runs parallel to the route determination- and EIA-procedure without any trade of information between the two tracks. An *interweaving* approach is nearly identical to the parallelization track but is interwoven with the route determination- and EIA-procedure track (Lenferink et al, 2012). Internationally there are some other EMI practices that are in the current institutional setting not applicable to the Dutch context and hence are not taking into consideration in this research. Core aims of EMI via interweaving, or parallelization is however to 1) increase room for creative solutions, 2) initiate or support the exchange of innovative ideas and 3) consider added value in relation to risks (Lenferink et al, 2012). The implication of this is an increased implementation of Design and Construct (D&C) contracts and DBFM contracts. However, as Pakkala et al (2007) suggest, D&C and DBFM contracts only create added value if contractors are sufficiently free (and as such flexible) in applying their innovative solutions for the proposed development. This freedom or flexibility can only be achieved if contractors are 'early involved in the planning process - in the route determination/EIA-procedure' (Lenferink et al, 2012).

Other scholars like Scharpff (2013) and Volker et al (2012) have investigated the possibilities and applicability of so called *dynamic contracting* in Dutch procurement. Although this is a completely new approach in Dutch infrastructure planning by and large, it potentially is a very promising one. The increasing sympathy for these dynamic contracts can be regarded as a logical sequence on the trend from well-known 'regulatory contracts' towards more innovative and flexible agreements (Scharpff, 2013). Dynamic contracting is known for its relative high degree of innovation and flexibility, due to periodical revision and improvement of the contract.

An approach that is not new to the Dutch infrastructure planning landscape is the construction team approach. In a construction team the both client and contractors are collaborating in an integrated formation and upon mutual agreement a design is being developed. It is different from parallelization or interweaving in this sense that a contractor is involved after a route determination- and EIA track has been run through. Herewith there is no influence of the contractor to adjust the route determination- or EIA, but he is asked to optimize a design within the boundaries of these route determinations and EIA (Chao-Duivis, 2012).

### 3.8 Theoretical model

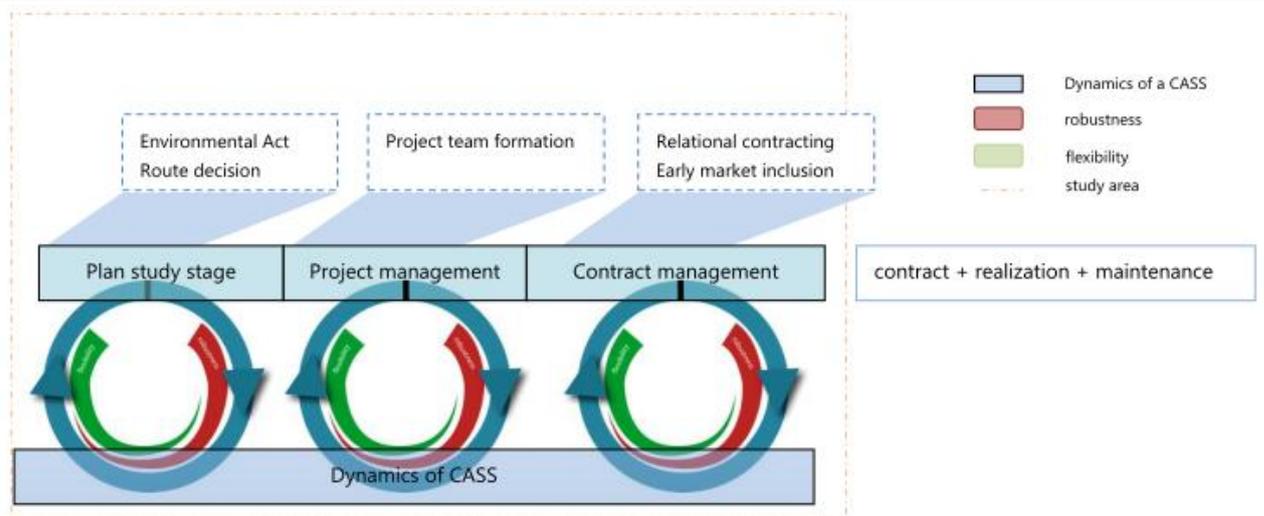
In the previous paragraphs we have elaborated upon the various aspects that constitute the Dutch infrastructure planning landscape. First we addressed the origins of dynamics in infrastructure projects, coming from a need to change and improve, rooted in Complex Adaptive Social Systems (CASS) theory. Second we distinguished the planning phase in which planning procedures are being run through, influenced by legislations that are applicable to infrastructure interventions such as the EA and the RD. After planning procedures shape is given to a project team that is interrelated with the final contract. In between these two decisions are being made about the project formation, project design and partnering/contracting strategy. At the root of our theoretical model is the distinguishing of three key important features within plan development and correlate with the phases and stages that have been elaborated throughout this chapter and. First is the acknowledgement that *change* is at the root of project initiation. The stages between the first emergence of change and the development towards an actual *project* can be seen as the explorative stages of a project. A third key feature is the *contract* as our last 'development' step before commencement of the construction phase, the latter being beyond the scope of this research.

To grasp some understanding of the changes that takes place throughout the planning lifecycle we will work towards a theoretical model in this paragraph. To do so, we will take into consideration the different layers or levels at which a planning takes place and how change in one layer may affect behaviour in that of others. The *plan study stage*, *project management* and *contract management* and the dynamics of CASS that we elaborated in paragraph 3.3 form the main pillars on which our theoretical model is based.

When we take the theoretical framework that has been elaborated above into consideration the question arises how one can break through the apparent impasse of limited flexibility, despite the attempts that have been undertaken in the last decades.

These first three features of plan development (plan study, project management and contract management) is what we refer to as the *planning lifecycle*. The planning lifecycle (Lenferink, 2013) by and large also incorporates *realisation* and *operation and maintenance* (eventually *demolition* too (Visser, 2011)). Although these latter features are integral part of the planning lifecycle they are not considered as being relevant to the scope of this study and are therefore not further elaborated in this research. Within the planning lifecycle and between the planning, project and contract features are possibly forwardly and backwardly influenced by respectively project management (Environmental Act, Route Decision Act etc.) and contract management (i.e. relational contracting and Early Market Inclusion). The importance of both flexibility and robustness throughout the planning lifecycle is visualized in this theoretical model via the two coloured schemes inhibited in the adjustment knobs, which show that the balance between robustness and flexibility is depended on decisions and agreements being made within the different stages of the planning lifecycle. The assumption in this theoretical model is that flexibility and robustness can coexist in plan development. The theoretical question that arises here is how robustness and flexibility can be equally distributed throughout the planning phase. This theoretical question can subsequently be further translated into a practical question, which is the core issue of this research: how can increased flexibility be achieved throughout the planning lifecycle given that change is apparent through all the phases and adaptivity is consequently needed.

Figure 3.9 Theoretical model (own model)



This theoretical model identifies three parameters, or in other words 'adjustment knobs', which can be adjusted and changed by different actors involved in the process and consequently influencing the balance between flexibility and robustness elsewhere in the planning lifecycle. The stages that are identified in the model are influenced by the dynamic surround of the intervention, regarded as a Complex Adaptive Social System. The adjustment knobs work as buffer between the stages and the dynamics in which the degree of robustness and flexibility can be adjusted. Moreover, this theoretical model implies a certain equilibrium between flexibility and robustness throughout a project which can be influenced by the adjustment knobs and hence by the different actors in the process. The adjustment knobs reveal that they can only be adjusted clockwise and that they are interrelated. For example: if the first adjustment knob is being rotated 20° (clockwise), consequently reducing the degree of flexibility, then thus the other adjustment knobs are rotated accordingly. As a consequence the reduction of flexibility in the plan study stage cannot be increased anymore in the project management or contract management stage.

In the earliest stages of a project there is a relatively large degree of flexibility, as there are not yet studies conducted and agreements being made. Throughout the lifecycle the adjustment knobs are adjusted clockwise, according to the progress of a project; consequently reducing flexibility. This theoretical model is supporting our research as we investigate how throughout the entire planning lifecycle the degree of flexibility can be sustained or increased whilst not compromising on its robustness. Consequently, this theoretical model relates with the dynamics of CASS and flexibility throughout the different layers in the observed system of planning, project and contracting.



# 4

## RESULTS FROM THE INTERVIEWS

In this chapter we discuss the results that can be derived from the various expert interviews and focus group session that have been conducted for this research. The results from the different interviews have been made anonymous; quotations are solely referred to professional background (client, contractor or consulting engineer) of that particular interviewee.

The results of the interviews are presented according to the three distinguished adjustment knobs from the theoretical model. As a consequence, the first subchapter presents the results with regard to *change* phase of a project. The second subchapter elaborates the results of the *project* phase and finally the third subchapter introduces results with regard to *contracting*. The results of the focus group session follow in chapter 5, as discussion points for this session are based on the results of the interviews.

### 4.1 Limitations of flexibility in the planning stage

As discussed earlier in paragraph 3.6, an internal demand for change within CAS is often a driver or initiator to kick-off or pre-develop a project. By considering the actors within planning, project and contracts as CASS we implied that their behaviour is affected by the highly dynamic, fluctuating and increasingly unpredictable desires and attitudes of the systems' surrounding.

All interviewees have been asked whether they felt that flexibility is limited in early plan development and if so, how that limited flexibility is caused. With regard to the issues that have been introduced in the theoretical model the interviewees have also been asked how those issues affect the earliest stages of plan development. The interviews showed that very often, in these earliest stages of plan development, decision-makers investigate the issue at stake (the change that is demanded) and explore the various alternatives. They thereby tend to immediately focus on possible solutions, rather than a range of solutions as a bandwidth to choose from. The tendency of policy-makers to immediately focus on one or a few possible solutions as direction of end-situations creates limitations which appear to be hard to let go in a later stadium.

The drivers for limitations in flexibility in the early stages of plan development are fivefold (see also table 4.1). First there is a legal demand (via the Environmental Act and Route Decision) to continuously investigate to a certain detail the environmental effects of certain interventions, especially with regard to noise pollution and air pollution, aimed at assessing the impacts for the surrounding of the system. Those acts appear to be rather strict, although certain flexibility tools are incorporated within act such as the Environmental Act. In an effort to reduce environmental effects to a maximum the whole process *'is pressed into each other, subsequently continuing on a designing/solution track again'*, as mentioned by an engineering consultant.

Second, there is an urge of responsibility of civil servants towards civilians and stakeholders to clarify and bring certainties in an early stage of development. The assumption under decision-makers is that *'the more certain and clear the information that they provide for civilians is, the better these civilians can weigh pros and cons of a project, the better they can formulate their say in the process and as a consequence the more democratic and legitimate the process will be'* (engineering consultant). Moreover is this urge for clarity and certainty demanded by the stakeholders too, as an opportunity to anchor desires into decision making.

In addition to these two limiting factors is, as felt by another engineering consultant, that Route Decisions generally are too prescriptive due to the technocratic background of developers of these Route Decisions. This implies that culture plays a role too. This interviewee gave an example of DBFM-contracts where the designing-part is so restricted that, so to speak, *'even the colour of the benches was designed'*. Thus, the designing D-part of this DBFM-contract was so restricted that it predominantly was considered by engineering consultants as well as contractors as an E for Engineering. Hence, a more fundamental question arises: how can a contractor then make a creative business case rather than just engineer the design and

arrange its finances? Or in other words: what is then the added-value of a DBFM-contract as opposed to more traditional contracts?

Another factor limiting flexibility in plan development phases was touched upon by an engineer consultant that has been interviewed who referred to the internal limiting regulations of institutions. It appeared that some institutions have regulations that negatively affect flexibility in plan development phases. Governmental organisational departments often develop internal regulations to which plan development documents must comply. Those regulations often are not necessarily legally embedded but must nevertheless be met in plan development, consequently limiting its possibilities or flexibility. Secular, departmental focus and *'a lack of interaction between overlapping governmental departments lie at the root of creation of these limiting internal regulations'* (engineering consultant).

The last factor that limits flexibility in the early stages of plan development is civil objections to plans and the subsequent jurisprudence of the Council of State. In an attempt of plan developers to make plans broader, adaptive and less prescriptive leads to a perceived uncertainty by civilians and as a consequence planning objections at the Council of State. *'A delay in project lead time is not the only negative effect of those objections; jurisprudence of the Council of State often aligns with the civil objections'* (client), consequently demanding plans to be more clear, certain and definite and thus, more prescriptive and less adaptive and flexible plans.

Table 4.1 Causes and underlying effects of limiting flexibility in early phases of plan development

Cause	Underlying effect
(rather) strict legal acts	<i>pressed into process - design/solution re-track</i>
urge of clarity and certainty of civil servants towards civilians	perceived public support and democratic process
technocratic background of developers	prescriptive, technocratic process design
internal limiting regulations (non-legal)	lack of inter-organisational or inter-departmental adjustment
planning objections and Council of State jurisprudence	perceived civil uncertainties

The interviewees generally agree upon that ideally, possibilities for solutions must be kept as broad as possible in an effort to give maximum flexibility for contractors to propose their most suitable solution. This implies that margins for construction are as wide as possible.

## 4.2 Increasing flexibility in the planning stage

Taking the aforementioned into consideration the question arises how we can work towards increased flexibility in the translation from a desired change towards an actual project, without compromising on the robustness of those plans. One particular approach that has been discussed by multiple interviewees is abstract or functional formulation in plan development documents. Sketches, documentation and communication should in this approach be formulated more functional driven rather than solution-driven; *'it is a chance to achieve more flexibility for contractors in a later stadium'* according to an expert from a consultancy firm.

This approach has some clear implications for civilians. I.e. if civil servants describe into their Environmental Impact Assessment that noise-limits shall not exceed a certain quantity of decibels it leaves much more possibilities for contractors than making that very same Environmental Impact Assessment based on a singular designed sound barrier. In this way, the solution-direction remains somewhat unclear albeit that the *effects* will be clear for the civilians and other stakeholders in the immediate vicinity. Another advantage of such an approach is that thus a contractor is forced to think of a solution, rather than that he optimises a solution-direction proposed by the client. To ensure that this approach is not compromising on the robustness of such plans, consultants of various engineering consultancy firms share faith in the strengths of

sketches or artist's impressions to give at least some insights about possible end-states, consequently coping with societal and political support.

That this approach is not without any concerns is explained by an engineering consultant specialized in plan development processes. There is a tendency amongst clients to try to formulate plan development documents in a functional and abstract way but it appears to be rather difficult as the Authorised supervision demands clarity that a certain solution is possible and viable including its external effects. One has to proof that a certain proposed development remains within the predefined boundaries by the Authorised supervision. As a consequence, *'an apparent tension remains between the Authorised supervision and the project team on how to proof the consequences of this functional formulation in plan development documents'*.

The root of too restrictive plan developments is very nicely explained by another engineering consultant as *'the demand of societies for increasing certainties and clarity is being answered by clients by increasing detailing and fixation in plan development documents'*. This tendency is one that should be breached as it embraces a false security; partially due to jurisprudence of the Council of State, demanding increasingly detailed and prescriptive planning proposals. Therefore, the approach that is elaborated above is one that increases the flexibility whilst not compromising on robustness and furthermore breaching through a tendency of false security through increased detailing and fixations. The *'risk that is possibly hidden in this approach is the anxiety of civil servant (cliental) project managers to loosen those fixations in plan development documents, as the one of the responsibilities and goals of a civil servant project manager is to achieve or maintain public support for the proposed intervention'* (contractor). The extent to which a civil servant project manager is able or willing to apply this approach of functional formulation is both individual- and context dependant. Thereby is it also very institutional-cultural driven. A less experienced institution is less likely to 'loosen the reins' than an institution that gained much experienced in recent years. Consequently, *'a more experienced institution is possibly better able to predict environments (civilian) behaviour than a less experienced institution'* (contractor).

For project managers from contractors is it an important contribution in this approach to persuade the civil environment of the projects that their organisation is able to limit negative impacts and reduce possible risks, also during construction. Therewith, the contractor project manager may be able to subduct civilian concerns and anxieties. As one of the project managers from a contractor exemplified: *'we can share our experiences from projects elsewhere in the country and organize field visits to projects where similar concerns occurred and where we managed to take these away'*. Consequently the robustness of a plan can be increased, or at least maintained, whilst attempts to increase flexibility can sustain.

Table 4.2 Advantages and limitations of functional formulations in plan development documents

Advantages	Limitations
leaving more possible solutions open to contractors	proof of viability and effects to Authorized supervision
clear formulation of <i>effects</i> of proposed development	anxiety amongst civil servants to loosen fixations
contractor forced to think of (innovative) solutions	context-dependent civil servant ability and willingness
effect of clients solution-direction minimized	
increased robustness due to sketches and artist impressions	

To summarize, in this paragraph we have investigated if limitations in flexibility in early stages of plan development are perceived amongst clients, contractors and consultancy engineers. From the interviews can be derived that all of these parties perceive such limitations. Subsequently, the causes and effects of these limitations have been investigated an elaborated, resulting in a fivefold of causes that limit flexibility in an early stage of plan development (see also figure 4.1). In an attempt to break through these limitations and increase flexibility without compromising on robustness of these plans we proposed a more functional

specification approach; an approach that was regarded with high potential and eventually even underlined by the majority of the interviewees. Finally, we have touched upon the implications of this approach for civilians in the immediate surroundings of the proposed intervention. Its advantages and limitations have been summarized in figure 4.2. In the next paragraph we will elaborate the implications for a project team in such an approach and address the various opportunities and pitfalls for the project phase of our theoretical model.

### 4.3 Limitations of flexibility in the project phase

One of the key characteristics of limited flexibility in the project phase appeared to be the anxiety and concerns of clients to leave spatial planning procedures to contractors, despite the acknowledgement of clients, consultancy engineers and contractors that integration of line infrastructure and spatial development is very promising. On the questions where this feeling of anxiety and those concerns originate from, an engineering consultant mentioned the deep-rooted Dutch culture of protection against water. *'Although the Water Boards were developed bottom-up, their responsibilities for protection against water were carried out in a top-down manner'*. Furthermore, it is stated that *'after the second World War the Dutch planning culture developed in a very classical modernistic, functional and top-down approach of makeability'* (engineering consultant). The current stronghold of clients to retain spatial planning at their disposal is limiting the contractor's flexibility in the sense that they thus do not have the ability to incorporate potential successful spatial developments in their bids. Subsequently they are constraint in their ability to coop with the local stakeholders too.

Another key issue with regard to limited flexibility in a project phase that emerged throughout one of the interviews is the apparent *'attitude amongst people involved in project teams to retain a very classical way of thinking'* (engineering consultant). That is, some form of restraint to think outside of the box or, in other words, to think creatively. This attitude shows clear resemblance with an issue that was mentioned earlier in one of the interviews that in a very early stage (i.e. exploratory stage) project teams already start investigating for possible solutions and with the predominantly technocratic educational background of people involved in project teams.

One of the limitations of flexibility in the project phase that was felt by contractors in particular was *'a lack of mutual trust between clients on the one hand and contractors on the other hand'* (contractor). Despite the notion that it is somewhat exaggerated, contractors feel that they are generally *'distrusted by their clients for being too wealthy, opportunistic and financially driven rather than quality driven'* (contractor). On the other hand these contractors distrust also their clients for *'being too rigid, too financially focussed and narrow-scooped'* (contractor). This lack of trust between contractors and clients feeds rigidity in their attitude towards each other. Although this may not be limiting or constraining flexibility in a direct sense, a transition towards increasing trust between the clients and contractors contributes positively to the mutual interrelationship between the two. Increased trust between client and contractor is also considered as contributing to an attitude of *mutual learning capacity*; an arena in which both parties learn to know each other, both in a positive and a negative sense. Learning about and appreciating each other's qualities and oddities in the project phase eases the cooperation in the realization phase, even under circumstances with increasing tensions.

To summarize, in this paragraph we discussed if and then how flexibility is limited within the establishment of concrete project teams. We found that all features that directly or indirectly affect flexibility within project teams negatively appear to be socio-cultural-rooted. All identified constraining features deal with a great extent of educational background, personal attitudes and behaviours and with deep rooted subjective perceptions and prejudices towards each other. In an attempt to counter these limitations, we introduce two types of cooperation. These two types each have the potential to parry these constraints of flexibility and hence aim to restore flexibility and innovative capacity throughout the establishment of and cooperation within a project team.

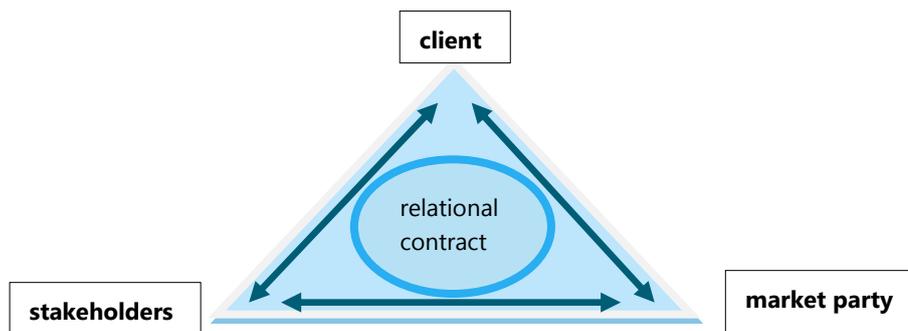
### 4.4 Increasing flexibility in the project stage: relational contracting

The first type of cooperation that appears to be a potential successful approach to coop with the flexibility-constraining factors in a project phase is Relational Contracting (Macneil, 1985; Cheung, 2010). A relational

contract is a contract whose effect is based upon mutual trust between the parties. The term *contract* may in this sense cause somewhat confusion. It is important to notice here that a relational contract in no sense shows resemblance with a constructional contract or the process of contracting in the realization phase of our planning lifecycle. Some scholars (i.e. Mouzas and Blois, 2008) argue that in essence every contract contains a relational component as it touches upon an agreement between two or more parties. A relational contract however is defined as '*[c]ontracts in which what is expected by both sides is not written out in detail but develops as an ongoing relationship*' (Chrystal and Lipsey, 1997. P. 702). Furthermore, it '*deals with identifying and endeavouring an approach of mutual benefits through developing cooperative relationships and establishing a mechanism of risk sharing*' (Essays, 2013. P. 1; CRC CI, 2002). Thus, '*a relational contract concentrates not so much on the content of the project at stake; it concentrates on the relationship between the contracted parties*' (engineering consultant). Within such a relational contract agreements are being made how the involved parties deal under certain (also critical) circumstances and how one should approach, inform and coop with another.

In the understandings of this research, and as proposed in some interviews, '*a relational contract should not solely consist of an agreement between client and contractor: it should be a triangular relational contract between client, contractor and the stakeholders in the immediate vicinity of the project*' (engineering consultant). As argued in some interviews a relational contract could positively affect: 1) the relation between client and contractor, 2) the relation between client and stakeholders and 3) the relation between contractor and stakeholders.

Figure 4.3 Visual conceptualization of a triangular relational contract (own model)



First, the relation between client and contractor improves because a relational contract discourages 'lean' working, which ensures distrust and defensive behaviour between clients and contractors. Moreover, have '*adverse approaches to contracting in the construction industry ... led to a reduced efficient industry with lower productivity levels however, the relational contracting approach has evidently increased the efficiency by developing partnering agreements and joint team goals and reviews that enhanced financial returns and reduced incidents and conflicts*' (Essays, 2013. P. 3; Latham, 1994; Egan, 1998; for a further elaboration on partnering see also Leendertse et al., 2015). Subsequently one may assume that the distrust as perceived between contractors and clients can be reduced with a relational contract and hence stimulate a process of increasing credibility between contracted parties. Furthermore, as Essays (2013) argues, stimulates the creation of networks and subsequently enhances goodwill.

Second, the relation between a client and stakeholders can be further improved with relational contracting. A strong collaboration between the two stimulates intensive interaction between the two within projects. Here we detect a chance to sustain flexibility and induce adaptability whilst integrating both infrastructural development and spatial development. By promoting bottom-up initiatives for spatial developments in the immediate surrounding environment of a top-down initiated infrastructural development civilians '*can actively involve and actually contribute to the integrated development and are partially responsibly to factual physical interventions*' (client). By doing so, the civilians are more likely to perceive and appreciate their involvement as opposed to rather secular and top-down imposed information-meetings. Consequently one may assume that civilians are less likely to object to the proposed developments and hence contribute to the flexibility of projects in the plan development phase (see also paragraph 4.1).

Third, a relational contract is contributing to the relation between contractors and stakeholders. In current practices stakeholders are predominantly in contact with the contractor who is constructing the project in information sessions, in-situ open days and sometimes in design workshops where stakeholders can only partially ventilate their opinion. Hence a *'generic feeling of exclusion can emerge'* (contractor). By *'incorporating stakeholders in a triangular relational contract the stakeholders are effectively included into a project and hence derive certain responsibilities from it'* (contractor). An intensive interaction between clients, contractors and stakeholders may even lead to the acknowledgment and accordance of fundamental uncertainties to be clarified later in the process. This latter statement is an important one as this will intrinsically *'contribute to the flexibility and adaptability of the contractor during the entire planning lifecycle and more specifically during the realization phase of a project'* (engineering consultant).

Although relational contracting is ought to be a very promising approach that can relatively easily counter the limitations of flexibility in the project phase some critical remarks are also to be made. The extent to which a relational contract is effective and efficient is highly dependent on the degree of complexity of a specific project. Working towards such a relational contract is a labour intensive and a time consuming process. For less complex issues the transaction cost of realizing a relational contract can be disproportionate to the benefits it yields. In very complex projects on the other hand one may face a wide variety of stakeholders. The question arises who to include in such a relational contract and who not and who may represent whom. This also touches upon an ethical issue: what if a certain stakeholder is dissatisfied with the stakes his representative(s) represents? In other words: *relational contracting to whom?* Another key issue that can be raised towards relational contracting is how to define the boundaries of a project and the stakeholders within these boundaries; this addresses the question of *relational contracting to what ends?* The last issue that relational contracting is unable of coping with is the perceived classical or conservative mindset of project team members. This asks for a different role and attitude of the various actors involved (see also paragraph 5.3).

To summarize, in this paragraph we discussed a proposal to increase flexibility in the project stage. We did so by the conceptualisation of relational contracting; an approach that was suggested by an engineering consultant. A relational contract is characterized by a triangular agreement with the 'traditional' contract partners: the client and the contractor, but where the stakeholders (the dynamic surrounding of our system) are contracted too. Consequently a relational contract is ought to be contributing to the *'flexibility and adaptability of the contractor during the entire planning lifecycle and more specifically during the realization phase of a project'*, as was mentioned by an engineering consultant.

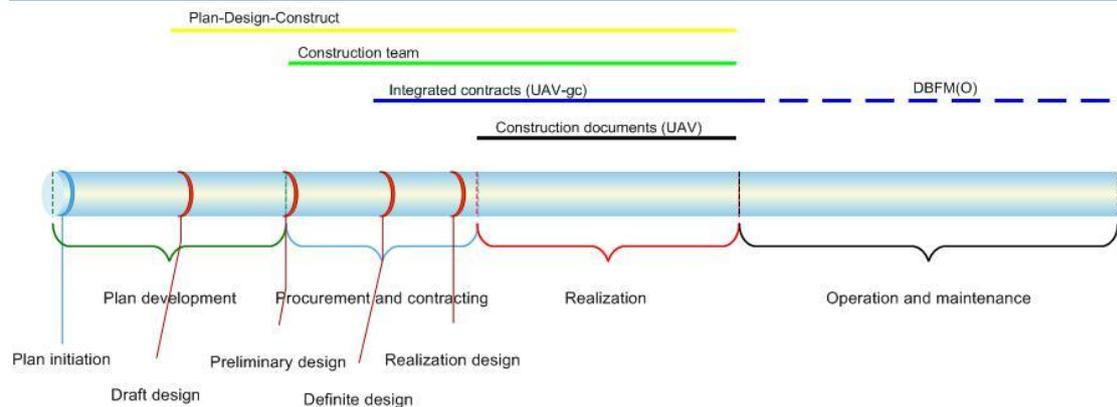
#### 4.5 Limitations of flexibility in the contract stage

One of the characteristics from the 'hollowing out of state' or New Public Management era that emerged somewhere in the 1970's is the process of outsourcing and contracting. It has brought us this far that *'we have lapsed into an Anglo-Saxon corporate world in which we continuously try to narrow everything down into contracts and assume that we can solve everything with those contracts'* (engineering consultant). This engineering consultant found it therefore especially surprising that *'the process before contracting, the procurement phase, is almost entirely non-contracting'*. Despite that the process before contracting (procurement) is nearly completely non-contracting and that the participation of contractors in no sense is a guarantee for work, apparently contractors are willing to contribute to the process on a non-contractual basis.

The process *before* contracting, the procurement phase, is a process in which *'clients shape conditions to participate in projects'* (engineering consultant). Not complying to those conditions inherently implies exclusion of further participation of the process. As a consequence, this engineering consultant stresses the importance of a broad scope as *'shallow scoping is limiting you position towards stakeholders since a contract is only client <> contractor, but despite that those other stakeholders are not incorporated in the contract they remain with their share'*. Neglecting those stakeholders may result in quick wins but they inevitably will influence the process on the long run. This may be captured in a relational contract; see also paragraph 4.2.

Many interviewees stated that although many types of contracts allow for or have the opportunities for the incorporation of flexibility, yet many times they still don't actually contain this flexibility. Taken that into consideration the interviewees have been asked how a contract can contribute to achieve increased flexibility. In an effort to increase flexibility throughout contracting processes interviewees have been asked how this could be achieved. Nearly all interviewees referred here, albeit not always explicitly, to the planning lifecycle and the early market inclusion we discussed in chapter three. As mentioned in one of the interviews, 'the strength of the flexibility and creative capacity of a contractor lies in *freedom to design*' (client). In this part of the contract the contractor can incorporate his flexibility and innovation and subsequently maximize their added value. The planning lifecycle and the identified stages from our theoretical model, as shown in figure 4.4, show at which point a certain type of market inclusion occurs. The two types of early market inclusion that will be further elaborated in the next two subparagraphs (construction team and plan-design-construct) are incorporated here too.

Figure 4.4 Market-inclusion model (own model)



#### 4.5.1 Increasing flexibility in the contract stage: a construction team

All the representatives from contractors that have been interviewed stressed the importance of and their satisfaction with the Construction team. The construction team is a specific type of partnering; in an early stage of plan development a client includes a market party contractor to further develop a project together. In this construction team process a 'market party contractor is usually included in the stage of development stage' (contractor). Thus the market party contractor is able to think and design along with the client starting from a point of preliminary design. After a client and his partnered contractor have developed a plan successfully, this specific market party contractor is (under normal circumstances) awarded to realize that plan.

This type of partnering is regarded as very promising by contractors and should, according to the interviewed contractors be applied more often. This approach is ought to contribute to flexibility in various ways. First, with this type of early market inclusion the contractor is able to '*critically think along with his client and therewith is also able to introduce and propose the innovations and optimizations he foresees*' (contractor) and of which the client possibly wouldn't have thought of if he would have developed his plan alone. Secondly the contributions of the contractor can be incorporated in an early stage of development. Thus, his optimizations, innovations and added value can still be incorporated in plan development documents such as a Route Decision. The third argument that addresses the advantages of a construction team in order to achieve increased flexibility in the contract phase is that '*both client and contractor get to know each other and each other's abilities and weaknesses in a very early stage of plan development*' (contractor). This statement follows the same pattern as our argument for relational contracting we proposed in paragraph 4.4. The fourth and last argument that is ought to be in favour of applying a construction team is that '*an early selection or funneling to one or a few contractors is that this contractor or these few contractors can focus on this project on a maximum as cooperation in such a construction team is nearly a guarantee for work*' (contractor). This also implies that the contractors that were not chosen at random or who were not invited to join this construction team can focus on other, different projects rather

than putting useless efforts in a project they will not get awarded. Consequently the squander of public money is reduced.

Of course, as with every other type of contracting, weaknesses are identifiable too. First, clients have to be very careful which information they provide to their intended contractor and which not. Clients have to be careful that they do not provide sensitive or important information disproportionately to their intended contractor as this may provoke litigations from other contractors. A second issue that clients should be aware of when issuing a construction team is opportunistic behaviour of its contractor. A construction team *'demands a different role of the contractor too'* (contractor), as he must be able to strategically think with his client and add value to the process, rather than just focussing on starting the final construction of that particular project as soon as possible. A third issue that should be treated very carefully is the transparency of the process; who should the client invite as prospective partners and on what criteria should be funnelled to subsequently end with one contractor to join in the construction team. A non-transparent process could, as with the first identified issue, lead to litigations from other contractors. The last issue that should be considered when issuing a construction team is an early and equal allocation of rights and responsibilities. That is, who is responsible for what and who has a right to what? This implies that also the most difficult criteria, the allocation of finances should be agreed upon in an early stage of construction team set-up.

#### 4.5.2 Increasing flexibility in the contract stage: Plan-Design-Construct

The Plan-Design-Construct-contract, hereafter referred to as PDC-contract is a broad, integrated contract in which plan development, design and construction is being tendered to one contractor or combination. This allows the contractor or combination to co-create the solution direction, within the predefined boundaries. This PDC-contract is very often tendered via Best Value Procurement; a procurement strategy that selects the preferred contractor or combination based on its knowledge, skills and experience. Contracting based on Plan-Design-Construct has some clear advantages compared to contemporary contracts. First, both contractors and consultancy engineers are forced to collaborate in early stages of plan development and as a consequence, cross-pollination takes place between plan development, plan preparation and construction. A continuous focus on end-results allows for implementation of innovations and maximized realisation efficiency (Rijkswaterstaat, 2014). Second, due to the integrated character of the contract, risks and responsibilities associated with the project can be more equally shared amongst client and the contractor. This importance is also stressed by multiple interviewees with various backgrounds from engineering consultants, clients and contractors by stating that *'risk adverse behaviour by clients is not contributing to the flexibility and innovative capacity of contractors'* (engineering consultant). Moreover, an equal or fair allocation of risks amongst both clients and contractors is considered as one of the key conditions for successful partnering (Leendertse et al, 2015). A third and last advantage of a PDC-contracting process is that the comfort of having the same (combination of) parties on board during all phases of a development (Rijkswaterstaat, 2014). In one of the projects where a PDC-contract was applied, the Nederrijn project appeared that the contractor was able to couple certain chances while reducing risks. Furthermore, was the contractor for three subprojects able to obtain an environmental permit; a process that is considerably quicker than an application to change zoning. Another advantage that is derived from the Nederrijn project is that if a delay threatened to appear in a certain subproject, the contractor was able to continue construction in another subproject, consequently minimizing risks on delayed completion of the entire project (Rijkswaterstaat, 2014).

To summarize, in this paragraph we identified motivations and underlying causes for the limited flexibility in the contract stage. Key limitations here are classical or technocratic ways of thinking and working. Another identified issue is the tendency to *'narrow everything down into contracts'*, as mentioned by an engineering consultant, even though a contract is not a guarantee for successful collaboration. To increase flexibility in this stage of our theoretical model, interviewees were asked how this could be achieved. Two proposed approaches, retrieved from contractors and engineering consultants, are the construction team approach of market inclusion and a PDC approach; a relatively new approach of even earlier inclusion of market parties (see also 4.4). In the next paragraph we will critically reflect upon the presented results, before moving to chapter five in which the result from the focus group session are presented.

#### 4.6 Increasing flexibility and stimulating innovation towards the future: a critical reflection

The question arises how increasing flexibility can be achieved and how creative capacity and innovation can be stimulated. The proposed method that we discussed earlier, to commence plan development after procurement is ought to *transform* ways of thinking and attitudes of project teams, and as a consequence contributing to flexibility and the stimulation of innovation. In other words, a liberal-minded investigation of a process and plan development before precipitating in legislative procedures is ought to be more flexible and triggering for innovation than contemporary discourses.

A second possible contribution to increased flexibility and stimulated creative capacity and innovation is the design of the contracting process. Although the Procurement Directive (Aanbestedingswet, 2016) is extensively elaborated in Dutch legislation it is relatively open in designing the procurement strategy and its forthcoming requirements. Hence, one of the interviewees recommended '*be [as a client] a bit more loose and flexible in designing your procurement process and bandwidth for tailor-made solutions*' (engineering consultant). He furthermore stressed the importance of shaping conditions in which solutions may be sought rather than a solution driven strategy and work towards a fair and transparent process.

Clear advantages of more flexible and triggering approaches raise the question why such an approach is not implemented yet and thus demands a critical reflection. One of the possible constraints of such an approach is that due to its novelty the '*risk of failure is relatively high*' as stated by an engineering consultant. The consequence is that clients appear to be somewhat restrained in applying a new strategy; '*after all is commencing a procurement strategy serious business: it costs a decent amount of (financial) resources for both clients, candidate contractors and any other parties involved*' (engineering consultant). This may account as an obstructive reason for not shifting towards such a new strategy, hence reinforcing the tendency to hold on to contemporary procurement strategies. This impasse or lock-in can only be broken by *frontrunners*, those who are both willing and able to try and implement such a strategy (i.e. RWS with its 'competitive dialogue' and ProRail with its 'alliance'). Another issue with regard to these relatively new approaches is that due to the intensive and early inclusion of contractors these approaches have relatively high transaction costs. As a consequence, '*these approaches may be only viable in larger and relatively complex projects*' (contractor). Hence the degree of complexity of a project becomes a criterion in the assessment of how applicable these approaches are.

# 5 RESULTS FROM THE FOCUS GROUP SESSION

In order to further critically reflect on the results from the interviews a focus group session has been organised. In this focus group session representatives from three types of organisations (clients, market party/contractors and consultants) discussed about statements that have been developed and retrieved from the interviews (for methodological and organisational concerns see paragraph 2.2.3). The statements are on purpose being proposed explicitly to provoke a lively discussion. The statements that have been discussed in the focus group session and the results of these discussions will be presented hereunder.

## 1 Clients must specify more functionally in their plan-developing documents.

- By a more functional specification in plan-developing documents (such as a Route Decision or Provincial Environmental Plan) and less design/solution-driven specifications from clients, a more broadened bandwidth is given to contractors to propose their flexibility and innovative capacity more effectively.

Although it is a very admirable approach to increase flexibility it is one that must be handled carefully. A contractor stated that for example that *'every step that a client is not taking in his contract- or procurement phase and hence, has to be developed by a market party contractor is taking considerable longer for this contractor than it would have take for the client; sometimes up to five times longer'* (contractor). An example of these steps is *'making arrangements with civilians that live in the immediate vicinity of a proposed project'* (client). For contractors it is sometimes also *'pleasant or convenient that certain features of a project are already fixated as the flexibility and innovative capacity for contractors is predominantly concentrated in techniques and not so much in spatial planning procedures'* (contractor). A client adds to this that they *'purposefully fixate features in their plan-developing documents because they made agreements with other parties'* (client) (such as residents or affected organisations). This argument shows clear resemblances with the arguments in paragraph 4.1 that was, amongst others, addressing the cliental responsibilities towards public support. Not specifying functionally may lead to solutions or end states with a lower quality of a system than expected. A contractor furthermore argued that *'the weighing of the degree of negative impacts or compensation that a resident must accept is not one to make by a contractor but remains a cliental responsibility'* (contractor). Finally, a consultant argued that an *'intrinsically functional specified plan-development document implies that agreements with other parties must be made by contractors in a later stage of the planning lifecycle'* (engineering consultant). It therefore makes these processes expensive too and, as mentioned by a client, such an approach needs to be carefully weighed and hence may only be applicable in large and complex projects.

## 2 Plan-Design-Construct approaches, whereby contractors are involved before the preliminary design (see paragraph 4.5 and figure 4.4) en wherein on the basis of the best proposed plan, plan development phases are being run trough increase the possibility for flexible plans.

PDC approaches are a relative new approach in the Dutch planning landscape. One critical issue with regard to this approach is, as mentioned by a client, that *'the more functional, open and adaptive character of this approach may be regarded as open-ended by civilians, causing them to object planning procedures'* (client). The subsequent effect is, similar to our argument in paragraph 4.1, that the Counsel of State is in favour of civilian objection and thus demands solutions to be more concrete (and less flexible) than a PDC approach is ought to be. Furthermore, is, similar to the first discussion point, argued that the interweaving of spatial procedures and developing a project is not as effective as the PDC approach aims *'because spatial procedures and development is not within a contractor's expertise and hence ineffective'* (contractor). The reason that market party contractors are ineffective in running through and developing spatial procedures is that it is too socially loaded and thus a clients' responsibility. This is further stressed by the statement of a contractor that *'we not very often can propose a solution which our client hasn't thought of yet; we are just better in optimizing such a proposal than our client'* (contractor). However, a client exemplified that they often focus of traditional solutions as they are experienced and familiar with these solutions. This does not imply

that they are not open to more flexibly or innovative solutions but that if a contractor offers such a solution he is also responsible for that solution and is *'ought to take the risks for [his] account'* (contractor). Nevertheless, it is also noted in the discussion that often spatial procedures *are* being run through by market parties (commissioned by clients) but that it is a different market; that from consultancy firms. It must be noted that this perspective differs from the interview perspectives in paragraph 4.2. Finally, it is argued that if dialogue sessions in a PDC approach are not running easily, a *'client will not be likely to loosen reins and allow for more flexible and innovative solutions'* (client). On the other hand, when dialogue sessions *do* run smooth, a client *'will be much more open to flexible and innovative solutions and hence be more likely to loosen the reins'* (client). Furthermore, is it important to notice that the tightening of once give flexibility throughout a process is *'not appreciated by contractors and can disrupt successful collaboration between client and contractor'* (contractor).

### **3. Contemporary contract types like the RAW and UAV-gc are too rigid in their dividing line of risk allocation and therewith constrain maximized flexibility and innovation within a project.**

- De fixed dividing line in the shifting risk allocation between client and contractor (respectively before and after a tender) is too rigid en impeded therewith the flexibility and innovation of plans.

Within the focus group session this statement was not necessarily agreed nor debunked although it was argued, predominantly by clients and consultants, that a certain change within contemporary approaches would not necessarily be bad. On the other hand should different or innovative processes be developed carefully and applied selectively; only to those projects that really fits them and in which the processes can function as a pilot project. I.e. the *minimal-regulations pilot* of RWS at Nijkerkerbrug, as a contractor mentioned. Contemporary contracts such as the RAW and UAV-gc predominantly deal with realization methods and not so much with solution methods. Nevertheless, also within a different approach towards contracting and contracts *'it remains important to agree upon key responsibilities and regulations such as finances and risk allocations'* (client). In this way, as will also be presented in discussion point 4, a client will retain a much more flexible and cooperative attitude towards proposed plans that differ from the initial plan than a client would retain otherwise. In an effort to answer the question on *how* to change rigidity in risk allocation and cooperation it was proposed by a client to *'incorporate a period of reflection after tender'* (client) to indentify each others' strengths and weaknesses, align the scopes towards a project and to co-develop mutual trust and willingness to cooperate. This approach shows slight resemblance with a relational contract or the processes that (ought to) take place in a construction team approach.

### **4. A relational contract between client, contractor and local residents increases flexibility and innovation within a project.**

- A contractual triangle between client, contractor and local residents leads to more acknowledgement and increased appreciation of each others' stakes and responsibilities. This appreciation and acknowledgement contribute to increased flexibility (due to increased trust and less rigid interrelations) and increased innovation (due to a trilateral dialogue in a quest for solutions).

A relational contract is regarded as very promising by almost all participants. As an engineering consultant explained: *'it is a nice attempt as RWS continuously stimulates the interaction with local residents but hardly provides any tools on how to do this'* (engineering consultant). This is enhanced by other clients and contractors too as relational contracting is a completely different approach than contemporary relations with local residents which are often regarded as unsuccessful. Professional inclusions of the environment can increasingly contribute to constructive and flexible agreements with the contracted parties. As a client stated: *'negative effects for local residents is not by definition bad, as long as you actively include them in the process and as long as they get back something valuable'* (client). It is thought that the role of the local residents will become even more important as their role in this projects shifts from *stakeholder* to *shareholder*. A client furthermore stated that his organisation is *'very open and flexible in approving certain solutions and measures if they have been co-developed and agreed upon by the other contract partners'* (client): a contractor and the local residents. However, the latter may be very context and cultural dependent; an experienced cliental organisation may be more likely to retain such an attitude than less experienced clients.

The shift from stakeholder to shareholder in a relational contract also implies that the local residents must be organised professionally too. The question that remains unanswered is whether these local residents are able

to organise themselves professionally and whose share is represented by whom. For very complex and large projects the group of local residents may be so big that it is nearly undoable to organise themselves effectively. Furthermore, a relational contract implies that local residents as contract partners are responsible for certain risks too. It is questionable to which extent local residents are able to carry certain risks. These issues all correspond with the remarks being made earlier in paragraph 4.4.

**5. Besides line infrastructure should also the spatial plan development be incorporated and tendered to contractors.**

- By incorporating spatial plan development to contractors too, they are triggered to develop plans that can count on the local residents' approval. Therewith a part of the social responsibility that now mainly lies at the governments' disposal is being transferred to contractors. This makes contractors more flexible in their plan development and the local environment less rigid in her attitude towards these plans.

This discussion showed to overlap to a large degree with the discussion from statement two. Nevertheless some additional results were brought in here too. A contractor representative explained that *'the evaluation of a project in which this integration of spatial development and realization was incorporated revealed that nearly all involved parties agreed that this approach had failed and was not worth repeating'* (contractor). *'Initially the spirit of this approach was to interweave infrastructure development with spatial development and hence stimulate added value for the project by and large. The projects' practice was however that the infrastructure development and spatial development were allocated amongst various partners of the executive consortium and that both disciplines were hardly interlinked both within process and during realization'* (contractor). Thus the initiative has been overshoot and had not resulted in the desired effect.

Conclusively a client argued that *'the division of a large project into multiple smaller projects and contracts can work very successfully'* (client), based on his own professional experiences. This approach allows for flexibility in the sense that one can incorporate adaptive measures because these contracts are not being tendered at the very same moment in time whereas one overarching contract is being tendered at one specific point in time after which it is extremely difficult to incorporate changes and hence, lacks possibilities for optimization and flexibilities. Moreover, it was argued that *'to be effective, the decision to divide a project into smaller contracts must be applied consciously from flexibility perspective whereas it nowadays predominantly is applied due to political reasoning'* (engineering consultant).

To summarize, this chapter presents the results from the focus group session. In this focus group session the discussions that remained unclear or unanswered from the interviews are put on the discussion table in which clients, contractors and engineering consultants participated. The main result from this focus group session is that for each proposed approach (in the discussion points) the argument is valid that the applicability of that approach is depended on the complexity and local circumstances of the system and that these approaches cannot simply be taken for granted.



# 6 CONCLUSION, DISCUSSION AND RECOMMENDATIONS

We live in an increasingly dynamic and uncertain society that at the same time is increasingly dependent on mobility and thus on our infrastructure systems. As a consequence, the Dutch have developed a comprehensive infrastructure system in the last few decades and, inevitable, developed an extensive degree of expertise and technical know-how in how to develop such infrastructures.

In this research we investigated how flexible current infrastructure developments are, and how and where this flexibility is limited or constrained. We furthermore presented the issues and the underlying reasons for limited flexibility. In an attempt to improve our current approaches for infrastructure development we identified and proposed various tactics and tools that can initiate and stimulate increasing flexibility. We not solely focussed on the role of market party contractors but also on the roles of clients, society and engineering consultants too.

In the previous chapter we presented the results that have been derived from the interviews and focus group session being held. For each adjustment knob of the theoretical model we elaborated how flexibility is limited and subsequently how it could be breached or increased. We identified these factors and discussed the reasons and effects of these limitations. The proposed approaches for increasing flexibility have therewith too been critically reflected upon and summarized in a improved theoretical model. In this chapter we will first answer the research questions based on the results of the interviews and focus group and then discuss how we can work towards increased flexibility throughout the planning lifecycle, supported by a improved theoretical model. We will do so by the conceptualisation of resilient infrastructure development.

Furthermore, we will provide recommendations for further research.

## 6.1 Answers to the research questions

In paragraph 1.3 we presented our research question, bolstered up with sub-questions. In this paragraph we answer these questions, based on the results from chapters 4 and 5. These main and sub-questions are also reflected and summarized in the improved theoretical model in paragraph 6.2. The first sub-question to be answered is:

### **What are constraints with regard to flexibility within the plan conceptualisation- and plan development phases?**

With regard to flexibility within the plan conceptualisation we identified some key constraints that limit this flexibility, as all actors (clients, contractors and engineering consultants) perceived such limitations in flexibility. Results reveal a fivefold of causes that limit flexibility in an early stage of plan development: 1) the rather strict legal acts, especially with regard to noise- and air pollution, 2) an urge of clarity and certainty of civil servants towards civilians, aiming at designing a democratic decision making process, 3) technocratic backgrounds of public developers, to focus on technical solutions, 4) internal limiting regulations (non-legal) within public organisations and a lack of inter-departmental adjustment and 5) civil planning objections and Counsel of State Jurisprudence.

In the second sub-question we present the motivations to incorporate these constraints and limitations with regard to flexibility.

### **What are motivations to incorporate limitations and constrains with regard to flexibility?**

The motivations to incorporate limitations and constraints of flexibility correlate with the actual constraints we discussed in the first sub-question. First, the urge of clarity and certainty of civil servants towards civilians is rooted in the assumption that the more clear and certain a proposal is, the better civilians can decide to object or not and hence, the more democratic a process is. A second motivation for reduced flexibility is that in attempts to increase flexibility in such an early stage, often this approach is rebuffed by the Council of State to increase certainty for civilians. A third motivation is the lack of mutual trust between clients and

contractors in the sense that the client distrusts contractors to propose a sufficient solution for the issue at stake and the distrust from contractors towards clients to tender a decent project.

### **How can increased flexibility be achieved within plan- and project development whilst not compromising on robustness?**

There are multiple approaches available to increase flexibility within plan- and project development whilst not compromising on robustness. For the three different stages in the theoretical model, different approaches are considered promising. For the plan study stage a more functional formulation within plan development documents can be attained. Consequently it gives a certain degree of clarity and certainty to the affected stakeholders whilst a broader range of solutions as a bandwidth to choose from can be proposed by the contractors. For the project management stage a relational contract can be developed. A triangular connection between client, contractor and the dynamic surrounding of the system is 1) discouraging 'lean' working and defensive behaviour from involved parties, 2) improves the relation between client and stakeholders and stimulates intensive interaction between them and 3) improves the interaction and relation between contractor and stakeholders as the stakeholders shift from *exclusion* to *inclusion* in the projects. For the contract management stage of our theoretical model two main strategies are presented to increase flexibility: a construction team and a PDC-contract. Both strategies can be characterised by a degree of Early Market Inclusion and hence, contractors can influence within the process to the degree of flexibility they need.

### **What are important considerations when applying strategies and approaches for increased flexibility and what are the effects on contracts and contracting strategies?**

The proposals to increase flexibility cannot simply be taken for granted. In other words: they may not be applicable or suitable in every project because they are too complicated, too expensive or too time consuming for the project at stake. In order to make a thorough assessment on the applicability and suitability one should take certain considerations in mind. The functional specification in plan developments must be demonstrably feasible and effective for the Authorized supervision. Moreover appeals this approach to the cultural specific characteristics of a client: 1) the anxiety of some civil servants to loosen fixations or 2) the context dependent ability and willingness of civil servants to attain this strategy. The applicability of a relation contract is dependent on the complexity of a project. If very simple, straightforward projects this strategy may be overdone whereas for highly complex projects this approach may be too fuzzy. Subsequently should project managers consider a relation contract to whom, and the ends of the relational contract. The approaches of Early Market Inclusion are, too, dependent on the complexity of the project (in line with the previous argument), facing relatively high transaction costs (as the market is involved in an early stage) and relatively high risks of failure, predominantly due to the novelty of these approaches.

### **How can increased robustness and flexibility be achieved within the plan- and project development of infrastructure projects and how does this affect the planning lifecycle?**

The Dutch legislation allows for a greater deal of flexibility within the plan- and project development of infrastructure projects. However, this flexibility is often not used. Key limitations of this flexibility have been identified in the first sub-question, supported with motivations for these limitations in sub-question two. Nevertheless, still some approaches or strategies are available to increase this flexibility throughout the three identified stages under research. These are a more functional formulation within plan development documents, relational contracting and (two types of) Early Market Inclusion. These approaches are therewith considered as being promising to increase the flexibility throughout our planning lifecycle. However, these are approaches are not always applicable. The considerations for their applicability are identified in sub-question four.

## **6.2 An improved theoretical model**

In chapter three the theoretical model was introduced, based on a theoretical framework that we discussed in chapter three too. In chapter four we presented the results that have been derived from the conducted interviews and the focus group session being held. In this paragraph we combine both the theory-based model and the results, based on the interviews and focus group session to present our improved theoretical model. The improved theoretical model can help clients, contractors and consultants to: 1) easily identify which factors limits flexibility in which phase of the planning lifecycle, 2) see which approaches could

possibly break through these limitations or constraints and hence increase flexibility and 3) take note of the critical remarks with regard to these approaches and hence take consideration of the applicability of these approaches to the project at their stake.

The framework shows the adjustment knobs from the theoretical model that can be adjusted accordingly to the balance between robustness and flexibility for each of the distinguished stages where adjustment can take place. The table there under identifies the limitations to current flexibility, the proposals for achieving increased flexibility and the consideration when applying for increased flexibility in each of the consecutive stages of the theoretical framework. These identifications are based on the results from chapter four and thus derived from the interviews and focus group session.

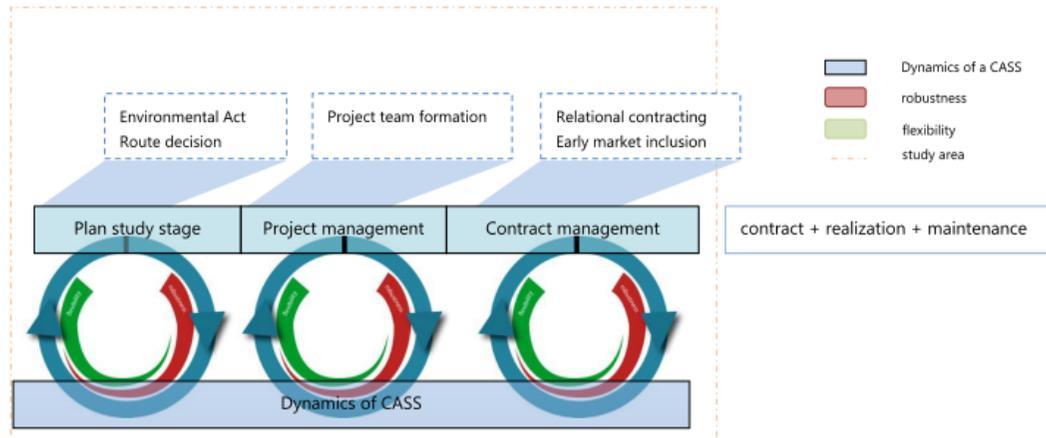
The improved theoretical model also reflects the answers to the research question from paragraph 6.1. The first and second sub question address: 1) which limitations and constraints can be identified with regard to flexibility and 2) which motivations drive the incorporation of these limitations. It appeared that some rather strict legislation and non-legal internal regulations within organisations demand a degree of certainty and hence limitations to flexibility. This is reinforced by tendency of Counsel of State jurisprudence and planning objections to limit flexibility and urge clarifications. This has, in combination with the rather technocratic background of plan developers, led to an urge of certainty and clarity of civil servants towards civilians. Less tangible limitations and motivations for limited flexibility are the anxiety of civil servants to assign spatial planning to contractors and the distrust between clients and contractors.

The third sub question assessed how increased flexibility in the planning lifecycle can be achieved whilst not compromising on the robustness of projects. We distinguished the functional specification in development plans in the earliest stages of the planning lifecycle. In the project stage of the lifecycle, when project teams are formed, a promising approach revealed to be a relational contract in which there is not a bilateral agreement with client and contractor but where a trilateral agreement appears on stage in which the local environment and other stakeholders get incorporated too and thus become a shareholder of the project. For the last adjustment knob it is argued that other (different to contemporary) contracting approaches, contribute to increasing flexibility. Elaborated examples of these approaches are the construction team and plan-design-construct which are part of early market involvement.

The results have revealed that implementation of these identified strategies is not applicable in every context and that hence some further features have to be taken into consideration. The success of the identified tools for increasing flexibility is dependent on the willingness and ability of civil servants to specify functionally, highly context dependent and hence, influenced by the anxiety to loosen fixations too. Then the proof of viability and effects to the Authorized supervision must be taken into consideration too; by specifying functionally enough to increase flexibility whilst robust enough to obtain approval of the Authorized supervision. Furthermore, it is important to weigh if the project at stake is complex enough to apply a proposed approach successfully and must some more fundamental questions (especially with regard to relational contracting) be defined too. This weighing should be based on project managers' expertise and experiences, although it remains very difficult to make this weighing SMART. Finally it is noticed that due to its novelty and minimal experiences with these approaches, they come with relatively high transaction costs and risks of failure.



Figure 6.1. Improved theoretical model



Limitations to current flexibility	Limitations to current flexibility	Limitations to current flexibility
(rather) strict Legal acts	anxiety and concerns of clients to leave spatial planning to contractors	'everything narrowed down into contracts'
urge of clarity and certainty of civil servants towards civilians	technocratic background of participants in project teams	possibilities for incorporation of flexibility often not used
technocratic background of developers	lack of mutual trust between clients and contractors	
internal limiting regulations (non-legal)		
planning objections and Council of State jurisprudence		
Proposals for increasing flexibility	Proposals for increasing flexibility	Proposals for increasing flexibility
functional specification in plan development documents	relational contract	construction team
		plan-design-construct
Considerations when applying increasing flexibility	Considerations when applying increasing flexibility	Considerations when applying increasing flexibility
proof of viability and effects to Authorized supervision	applicability is complexity dependent	applicability is complexity dependent
anxiety amongst civil servants to loosen fixations	relational contracting to whom?	highly transaction costs
context-dependent civil servant ability and willingness	relational contracting to what ends?	risk of failure

### 6.3 Interaction between theory and practice

The theoretical model that is presented and elaborated in chapter three, identified adjustment knobs in the planning lifecycles in which dynamics between robustness and flexibility interplay. In each stage of this theoretical model actors involved in the project make, consciously or not, decisions that affect the balance between robustness and flexibility in a sequential later stage of the theoretical model. Hence, the stages in the theoretical model function as adjustment knob for adjusting the degree of robustness and flexibility and hence, these latter characteristics of a plan shall never reach a stable equilibrium.

In an effort to grasp some understanding of the adjustment knobs and the decisions that make a project either robust or flexible we identified key limitations of flexibility in each stage of a project. Furthermore, an approach is proposed for each stage of a project that is contributing to increase flexibility throughout a project. The experiences and examples of the interviewees and focus group participants revealed however that these proposals are seldom a *holy grail* for flexibility; why would these approaches otherwise not be applied more often? Therefore, we distinguished some important considerations that help clients, engineering consultants and contractors in making a decision which approach to apply (see paragraph 6.2). This resulted in an improved theoretical model that we presented in paragraph 6.2.

The results from chapter four show some clear similarities with aspects from the theoretical model. The argument of Rauws et al (2014) that development plans increasingly tend to be rigid rather than robust was also empirically found in the results of this research. In an attempt to coop with public support and avoid juridical procedures, and consequently attempting to make a plan more robust, limitations of flexibility are incorporated in plan development plans. In practice it appears that this makes plans rather rigid as they limit flexibility, making them unable to adapt to changing circumstances. In figure 3.4 Rauws et al (2014) presented a framework for flexible development plans in which they proposed 1) small scale sub plans, 2) incremental development, 3) carrying structures and 4) loose rules. In our research we also found (in interviews and focus group session) a proposal to divide large scale projects into several smaller contracts or projects as contributively to increase flexibility. However, our results have not revealed anything similar to the second proposal of Rauws et al (2014) for incremental development; it remains unclear how to give shape to this proposal in practice. In the theoretical framework we already argued that carrying structures in our research is considered irrelevant as the infrastructures we are focussing on are in itself carrying structures. Not surprisingly the results also do not show any clue that resembles with carrying structures. The last issue that Rauws et al (2014) mention is the loosening of rules and is also stressed as important during the interviews and focus group session. The notion of Rauws et al (2014) that the degree of flexibility embodied in a project is not predetermined by laws but the result of choices by key actors is found explicitly true. We have found that although the degree of flexibility is by some degree limited due to legal demands the most pressing limitations for flexibility are inhibited by the decision makers in the procedure. In other words: the process of plan development in itself allows for a relatively large degree of flexibility but the degree of flexibility is finally given shape to by the considerations of plan developers. This notion is also incorporated in our theoretical model and improved theoretical model; adjustment knobs are of course mobilized through human intervention, not by laws and regulation. Conclusively, we would argue that some of the features from figure 3.5 are ought to be useful in practice too, albeit that not every distinguished feature is applicable to infrastructure development.

### 6.4 Discussion and recommendations for additional research

An analysis of the interviews and focus group session revealed that besides the aforementioned remarks three other key attributes are important for a sustainable and increased flexible planning lifecycle. These three key attributes overlap with, not coincidentally, the conceptualization of *resilience* as proposed by Davoudi (2012).

Although the term resilience has gained much attention in academia in recent years and that there is a tendency that resilience is becoming more and more a buzzword, this is a shortfall for the concept in itself. Originating from a once clear physical engineering perspective; the resistance of a system to external shocks and afterwards bounce back to the same situation or equilibrium as before it has moved into an ecological arena too. Here its conceptualisation was somewhat different. It touched upon the degree to which an

ecological system could withstand external pressures and afterwards evolve towards a new equilibrium or multiple equilibriums (Davoudi, 2012).

For the resiliency of the planning lifecycle however, the socio-economical conceptualisation of resilience is the best applicable as does not touch upon physical engineering perspectives nor on ecological systems. This socio-economical conceptualisation denies any existence of equilibrium as we are dealing with the non-linear and highly uncertain Complex Adaptive Systems we introduced in chapter three. In this research' quest towards increasing flexibility in the planning lifecycle we conclude that the three distinguished pillars the socio-economical conceptualisation of resilience; robustness, adaptiveness and transformability may contribute and support in achieving increased flexibility in infrastructural projects.

To conceptualize the results from this research and to recommend to the Dutch civil engineering and spatial planning arenas to achieve more flexible yet robust plans and projects we should strive for more resiliency in our current infrastructure development approaches.

In the current Dutch infrastructure planning arena robust project making is most predominantly present. Maybe not so surprising as the project initiators are most often governmental bodies that retain a large degree of public responsibility. In order to deal with this responsibility as carefully as possible the governmental bodies make agreements with the local residents who get possibly confronted with negative externalities of a proposed development. These agreements inevitably lead to fixations and prescriptions in plan development documents, contract-type decision making and subsequently the degree of flexibility in the contracts itself.

By making plans very robust and thus concrete, the local residents are not confronted with surprises or uncertainties. This enables local residents to rationally and consciously object or not against the proposed developments; thus leading to a democratic process.

Conclusively one could argue that the Dutch planning arena is practising very well in developing robust plans. On the other hand is the effect of robust plans that the other stage of infrastructure development get increasingly rigid and are therewith unable in utilizing the flexibility and innovations that may make a certain development not only one that works, but also one that adds value.

Therefore we would argue that the current Dutch focus on robust plan making is insufficient for realizing successful infrastructure development projects. Although we need to retain some degree of robustness in our plans we should shift our attention more to the degree of adaptiveness throughout the planning lifecycle of the infrastructure system.

### Flexible project control

The time between a first project initiative and final completion very often take multiple years, if not decades. Times in which the circumstances under which this project is being developed can change easily, partially due to the dynamics and unpredictability of the Complex Adaptive Social System. By making our infrastructure development projects more adaptive we can better anticipate on these changing circumstances and hence create more efficient infrastructures.

In this research we considered adaptiveness as flexibility. Flexibility in projects implies that a certain bandwidth and freedom to design is incorporated within the plan development documents, project team formation, procurement strategies and finally in the contract too. This enables all involved parties to adjust plans accordingly to changing circumstances. Inhibited in this flexibility is innovation and refers here to the ability and capacity of market parties' contractors to offer new, better or more efficient solutions than the client desired at the moment he tenders his project. A functional specification in plan development documents or different types of market inclusions (such as construction team of plan-design-construct) may enhance and allow for this increased flexibility and innovation. Consequently projects can potentially result in more value for money and/or a better functioning system. Such approaches nevertheless contradict with the urge for robustness and hence we can detect a conflict. From a socio-economical resilience perspective we detect only one section that can deal with this conflict: the transformability of project partners.

### Transformative project partners

Transformability refers, from a resilience perspective, to the extent to which actors are willing and able to change and, in the context of this research, can embrace flexibility and innovation. The way in which the role of a certain actor has to change differs amongst actors and per project. In general, however, we have seen throughout this research that market party contractors are able and willing to deal with increased flexibility. Moreover, do they consider it better for their business case and for the results of the project by and large when additional flexibility could be incorporated. However contemporary clients are not too open to enhance increased flexibility as they continuously bear their public responsibility in mind, rooted in the assumption that civilians cannot cope or deal with flexibility and thus uncertainty. To successfully apply the proposals for increased flexibility from this research we need to foster a societal change: enhancing uncertainty and hence, allow for flexibility. As a consequence we can achieve results that are best for projects, rather than best for individuals.

### Conclusive remark

Conclusively we argue that there are some clear motivations for limited flexibility within the planning lifecycle. Some of these limitations are insuperable but the majority of these limitations can, to some extent, be bridged. Dutch legislation allows to a large extent for increased flexibility, although our current practices do not reveal that we use this opportunity maximally. Some clear proposals increase flexibility have been identified and elaborated. That these approaches cannot be easily taken for granted; the demand some clear considerations. Thus, increasing flexibility is possible; we only need to implement it successfully. We can do so by pursuing more resilient project making!

In this paragraph we discuss the results that have been presented in this research in the sense of their scope and quality. Generally, the results represent a relatively holistic overview of the flexibility and robustness discourse in relation to infrastructure projects in the Netherlands. This statement therewith is also a first direct critical remark on the results: this research is explicitly grounded on a Dutch scoped theoretical framework with the presentation of legislation and identified steps in the planning lifecycle. Theoretical context may be different in other countries or regions and therewith possibly less applicable to non-Dutch situations. The very same is valid for the presented results. The results have been retrieved via interviews and a focus group session with entirely native Dutch experts in the field. Therefore, the results are completely based on their (Dutch) experiences and perceptions that not necessarily have to be valid in other countries or regions.

Despite these notions the results have been retrieved from a relatively broad range of experts. Multiple experts from different engineering consultancy firms and with various backgrounds have been interviewed as well as their attendance in a focus group session. This is also applicable to the results that have been retrieved from contractors; four experts have been interviewed from three different market party contractors with experiences throughout the Netherlands. Results from clients have been retrieved via two experts working for the same organization. Therefore, the contributions from clients can possibly represent a rather singular perspective on the questions asked which are not necessarily applicable to other cliental organizations or for similar organizations elsewhere in the Netherlands.

Interviews and the focus group session have been useful to derive results from and have led to a improved theoretical model that was able to first, clearly connect theory with empirical findings, second, provide an answer to the research questions and third, function as a tool for clients, contractors and engineering consultants as well as civilians in the vicinity of infrastructure development projects on how to effectively achieve increased flexibility. However there still remain some clear issues that this research did not provide in. Partially because it was outside the scope of this master thesis and partially because it was yet not possible, either within practice or in time frame. Therefore we recommend future researchers to investigate first, how effective the proposals of this research appear to be in practice and second, research how flexibility can be increased under circumstances wherein our proposals are ineffective.

# 7 REFLECTION

In this chapter we will critically reflect upon the research process by and large. We will touch upon the successes of the development process of this research as well as we mention the issues that can be (and have been) learned from.

## 7.1 Successes within this research

An early development of a research proposal, as well as an early and intensive start up meeting with my corporate and scientific supervisors has led to a relatively easy start of this research. Supported with a interesting research topic, both for my own educational and professional development as well as contributively to contemporary infrastructure development issues, in combination with a pleasant and stimulating working environment within Witteveen+Bos has been a large motivational driver while writing this thesis.

Partially due to other courses in the educational program it was relatively easy to find sufficient useful literature in the outline of the research methodologies and the development of the theoretical framework. Despite the notion that developing a sound theoretical framework is a very labour intensive and time consuming process has the access to state-of-the-art literature led to a relatively easy development of the theoretical framework.

Assisted with the professional networks of my corporate and scientific supervisors it was relatively easy to connect with the experts in the field to arrange interviews. Their contributions to this research have helped in timely retrieving the right information.

## 7.2 Doing a research: lessons learned

As with any process not everything went sound and smooth throughout this research. In this paragraph we elaborate upon what went not as expected and indentify which lessons are to be learned. Throughout the development of the first three chapters of this thesis, including the theoretical framework, some efficiency was lost. This effect was caused due to a sequential *waterfall* working attitude. In other words was it difficult for me to arrange interviews and start collecting data and finishing the theoretical framework simultaneously. Consequence some efficiency and thus time was lost. The lesson to be learned here is that I personally have to embrace that collecting data whilst still developing the general foundation of the research are not necessarily conflicting and hence may go side by side. This is a lesson that is not solely applicable when doing research but shall also be useful during professional development.

A second issue that appeared to be difficult is the organization and arrangement of focus group sessions. First of all want to stress that the focus group session being held was a very nice and lively discussion and I was pleased that I could welcome the participating experts, both from within and outside Witteveen+Bos. Nevertheless, it would have made the quality of this research a bit stronger if a second focus groups session would have been organized (as proposed in the research design). There I faced however some clear difficulties as it appeared to be a harsh challenge to arrange a wide range of experts on a pre-defined date, time and location, as already mentioned in paragraph 2.2.3. Despite various attempts to organize it appeared that this challenge was a bit too hard. Although it will always remain difficult to arrange state-of-the-art experts on a pre-defined date, time and location, the lesson to be learned here is to send invitations earlier in time and to a wider spectrum of experts, instead of awaiting a rejection and just then sending new invitation. Here too some efficiency was lost, finally resulting in the cancellation of the second focus group session.



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# Appendices



# I

## APPENDIX: APPROVAL FORM INTERVIEW

Ondergetekende verklaart hiermee in te stemmen met de voorwaarden van dit interview, overwegende dat:

- Dit interview wordt uitgevoerd in het kader van de afstudeerthesis van interviewer. In deze thesis doe ik onderzoek naar het creëren van meer flexibiliteit in infrastructurele planprojecten. Mijn afstudeerbegeleiders zijn ir. W.L. Leendertse (Rijksuniversiteit Groningen) en ing. E. Schaft (Witteveen+Bos);
- Ik wil u graag interviewen om meer te weten te komen over uw ervaringen met infrastructurele planprojecten, contract- en aanbestedingstrajecten en planprocedures. Het interview neemt ongeveer een uur in beslag;
- Voor een zorgvuldige verwerking van dit interview en de resultaten daarvan wordt van dit interview, met uw toestemming, een geluidsopname gemaakt. Alleen voornoemde begeleiders en ondergetekenden hebben toegang tot de geluidsopnames en transcripties;
- Alles wat wordt besproken gedurende dit interview vertrouwelijk zal worden behandeld. In geval geïnterviewde anoniem wenst te blijven worden naam en functie niet genoemd in transcripties en onderzoek;
- De resultaten van dit interview kunnen worden gepubliceerd in mijn afstudeerthesis en eventuele toekomstige wetenschappelijke publicaties;
- Bij ondertekening van dit toestemmingsformulier geïnterviewde recht heeft om:
  - Het beantwoorden van een vraag te weigeren;
  - Op elk moment de opnameapparatuur uit te schakelen;
  - Op elk moment het interview te beëindigen;
  - Verdere vragen te stellen met betrekking tot het onderzoek of het interview, hetzij tijdens of na het interview;
  - Om anoniem te blijven. In dat geval zal alles dat geïnterviewde kan identificeren in dit onderzoek en andere wetenschappelijke publicaties niet worden opgenomen.

'Ik geef toestemming om geïnterviewd te worden op basis van voornoemde voorwaarden'  
JA/NEE

'Ik wens anoniem te blijven'  
JA/NEE

'Ik wens een kopie te ontvangen van het transcript van het interview'  
JA/NEE

'Ik wens een kopie te ontvangen van het onderzoek'  
JA/NEE

Aldus opgemaakt te .....

Datum:

Naam respondent: .....

Naam interviewer: .....

Handtekening respondent: .....

Handtekening interviewer: .....



# II

## APPENDIX: INTERVIEW GUIDELINES

### Interview guideline Environmental Act (EA; Omgevingswet)

- Opening of the interview;
- Ask for approval for recording this interview;
- Introduction to the thesis and research questions and explain that this interview is focussed on questions with regard to the EA;
  
- How does the EA affect plan development by and large?
- Which features have to be legally determined/predefined by the EA?
- Do these determinations/predefinings constraint in any way to plan development?
- Is flexibility possible within the EA?
- If yes, how would this flexibility work out within the EA?
- Would increased flexibility lead to less vulnerable project development to changing contexts?
- If one wants to increase flexibility in the planning process, how should we see this with consideration to the EA?
- Can the suggestions of Rauws et al (2014) for increased flexibility work out in the EA?
  
- Closure of the interview.

### Interview guideline Infrastructure Act (IA; Tracéwet)

- Opening of the interview;
- Ask for approval for recording this interview;
- Introduction to the thesis and research questions and explain that this interview is focussed on questions with regard to the IA;
  
- How does the IA affect plan development by and large?
- Which features have to be legally determined/predefined by the IA?
- Do these determinations/predefinings constraint in any way to plan development?
- Is flexibility possible within the IA?
- If yes, how would this flexibility work out within the EA?
- Would increased flexibility lead to less vulnerable project development to changing contexts?
- If one wants to increase flexibility in the planning process, how should one then approach the IA?
- How can contractors get involved in IA procedures during plan development and what is their role?
- How can flexibility and innovation before and after a Route Decision (Tracébesluit) be achieved?
- Can the suggestions of Rauws et al (2014) for increased flexibility work out in the IA?
  
- Closure of the interview.

### Interview guideline Tendering / Contracts

- Opening of the interview;
- Ask for approval for recording this interview;
- Introduction to the thesis and research questions and explain that this interview is focussed on questions with regard to tendering and contracts;

- How can one achieve increasing flexibility in contracts/tenders?
  - Would this also lead to increased innovation for a project?
  - How would increased flexibility affect the design of contracts or tenders?
  - Would increased flexibility lead to less vulnerable project development to changing contexts?
  - Could early inclusion of contractors help to increase flexibility?
  - How could we include contractors earlier than contract/tender phases to achieve increased flexibility?
- 
- Closure of the interview.

# III

## APPENDIX: OVERVIEW OF INTERVIEWEES AND FOCUS GROUP SESSION PARTICIPANTS

### Overview interviewees and focus group session participants

Respondent	Organisation	Function	Date	Time	Location
Mr. R. Herrema	Witteveen+Bos	project director			Heerenveen
Mr. M. Westhuis	Witteveen+Bos	senior advisor contracting and procurement			Heerenveen
Mr. F. Verhees	Movares	director Space, Mobility and Infrastructure			Utrecht
Mr. S. Vrieswijk	provincie Fryslân	assistant project manager			Leeuwarden
Mr. E.G. Oostinga	REEF Infra	regional manager Nothern Netherlands			Groningen
Ms. J.E.C. Bulsink	Witteveen+Bos	project leader Plan Studies and Environmental Impact Assesment			Deventer
Mr. F. Popma	BAM Infra	regional manager Groningen- Friesland			Drachten
Mr. P. Van Wijk	BAM Infra	project manager			Drachten
Mr. A. Kirstein	K. Dekker	Director			Warmenhuizen
Mr. D. Jonker	Max-Bögl Nederland	Manager Acquisition			Heerenveen
Mr. S. Hoitinga	Provincie Fryslân	Programm manager			Heerenveen

# IV

## APPENDIX: GUIDELINE FOCUS GROUP SESSIONS

### notitie

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<b>Onderwerp</b>	Handleiding focusgroep sessie 20 mei 2016
<b>Project</b>	Masterthesis flexibiliteit in contractvormen en beperkingen vanuit planstudies
<b>Opdrachtgever</b>	n.v.t.
<b>Projectcode</b>	n.v.t.
<b>Status</b>	-
<b>Datum</b>	12 mei 2016
<b>Referentie</b>	n.v.t.
<b>Auteur(s)</b>	J.R.J. Wals BSc.

**Gecontroleerd door** ing. E. Schaft / ing. B. Strating MSc.

**Goedgekeurd door** -

**Paraaf**

**Bijlage(n)** routebeschrijving vestiging Heerenveen

<b>Aan</b>	Wim Leendertse	Rijkswaterstaat
	Sieds Hoitinga	Provincie Fryslân
	Duko Jonker	Max Bögl Nederland
	Frank Popma	BAM
	Rinze Herrema	Witteveen+Bos
	Marco Westhuis	Witteveen+Bos

## Aanleiding

Dit document fungeert als handleiding voor de focusgroep sessie die op **23 mei 2016** van **9.00 uur tot circa 10.30 uur** zal plaatsvinden ten kantore van Witteveen+Bos, **K.R. Poststraat 100-3, 8441 ER te Heerenveen**. Daarnaast is dit document bedoeld om de deelnemers aan de focusgroep sessie te voorzien van achtergrondinformatie en ter voorbereiding op de stellingen die ter tafel gebracht zullen worden. Tevens is in bijlage I van dit document praktische informatie bijgevoegd met betrekking tot de bereikbaarheid van de locatie.

## Achtergrond afstudeeronderzoek

Mijn afstudeeronderzoek vindt plaats in het kader van de masters Water and Coastal Management en Environmental and Infrastructure Planning aan de Rijksuniversiteit Groningen. Dit doe ik binnen advies- en ingenieursbureau Witteveen+Bos. In mijn thesis onderzoek ik de mogelijkheid naar toenemende flexibiliteit in plan- en contractvormingsfasen van projecten.

Vanuit (wetenschappelijke) literatuur blijkt dat het in planontwikkeling belangrijk is dat plan- en contractdocumenten robuust én flexibel zijn. De aanname voor deze thesis is dat flexibiliteit in de praktijk moeilijk haalbaar blijkt, evenwel essentieel om projecten en opgaven te realiseren in de hedendaagse dynamische werkelijkheid. Door middel van focusgroep sessies wil ik proberen te achterhalen hoe flexibiliteit in plan- en contractvormingsprocessen wordt beperkt (bijvoorbeeld door de omgevingswet of de tracéwet) en welke kansen er zijn om deze flexibiliteit te vergroten.

In een eerder stadium van dit onderzoek heb ik een aantal interviews afgenomen bij verschillende ingenieursbureaus, opdrachtgevers en opdrachtnemers. Op basis van de informatie die daaruit verkregen is zijn een aantal punten naar voren gekomen die waardevol zijn om te bediscussiëren. Daarom zijn een aantal stellingen geformuleerd. Deze zijn bewust stellig gemaakt om een discussie uit te lokken. Het doel van de focusgroep sessie is uitdrukkelijk niet om overeenstemming of consensus te bereiken over de stellingen; de discussie laat goed zien waar vanuit de verschillende invalshoeken moeilijkheden en/of problemen zitten. Het is overigens wel goed mogelijk dat er uiteindelijk overeenstemming wordt gevonden over wat de oorzaken van deze problemen/moeilijkheden zijn en hoe deze overbrugd zouden kunnen worden.

De focusgroep sessie zal door mij worden geopend met een korte presentatie, gevolgd door een voorstelronde door de deelnemers. Daarna zal de focusgroep sessie worden voorgezeten door Erik Schaft. Ik zal zelf meer op de achtergrond treden en verslag maken van de discussie. De informatie uit de focusgroep sessie en het daaruit voortvloeiend verslag zal worden gebruikt voor de verdere resultaatverwerking in mijn afstudeerscriptie. De resultaten zullen anoniem worden verwerkt. Voor de volledigheid wil ik graag de focusgroep sessie opnemen door middel van een geluidsrecorder, maar uw toestemming hiervoor zal van tevoren worden gevraagd. De focusgroep sessie zal circa 90 minuten in beslag nemen.

De stellingen die ter tafel zullen worden gebracht tijdens de focusgroep sessie zijn:

- 1 Opdrachtgevers moeten in hun planstudie-documenten functioneler specificeren;**  
Doordat opdrachtgevers in hun planstudie-documenten (een Tracébesluit, Provinciaal Impassingsplan of bestemmingsplan) functioneler gaan specificeren en minder in oplossingsrichtingen, wordt een grotere bandbreedte meegegeven aan marktpartijen om hun flexibiliteit en innovatief vermogen zo efficiënt mogelijk in te zetten.
- 2 Plan-design-construct procedures, waarbij aannemers nog voor het voorontwerp betrokken worden en waarbij op basis van het beste plan planprocedures doorlopen worden, vergroten de mogelijkheid op flexibele plannen;**
- 3 Gebruikelijke contractvormen zoals de UAV en UAV-gc zijn te rigide in hun scheidslijn van risicoverdeling en belemmeren daarmee maximale flexibiliteit en innovativiteit in een project;**

De harde scheidslijn in het verschuiven van de risicoverdeling tussen opdrachtgever en opdrachtnemer (respectievelijk voor en na contracteren) is te rigide en belemmerd daardoor de flexibiliteit en innovatie van plannen.

**4 Een relationeel contract (in driehoeksverhouding Opdrachtgever<>Opdrachtnemer<>Omgeving) vergroot de flexibiliteit en innovativiteit van het project.**

Een contractuele driehoeksverhouding tussen opdrachtgever, opdrachtnemer en omgeving zorgt voor een betere waardering en erkenning van elkaars belangen en verantwoordelijkheden.

Deze waardering en erkenning dragen bij aan meer flexibiliteit (door meer vertrouwen, minder rigide houdingen) en innovatie (er wordt in trilateraal overleg naar oplossingen gezocht).

**5 Naast de lijninfrastructuur moet ook de omliggende ruimtelijke ontwikkeling bij marktpartijen neergelegd worden;**

Door ook ruimtelijke ontwikkeling bij marktpartijen neer te leggen worden zij uitgedaagd om plannen aan te bieden die ook op goedkeuring van de omgeving kunnen rekenen. Daarmee wordt een deel van de maatschappelijke verantwoordelijkheid, die nu bij de overheden ligt, overgenomen door de marktpartijen. Dat maakt hen flexibeler in de planontwikkeling, en de omgeving minder rigide in haar houding richting deze plannen.

### Agenda

De agenda voor de focusgroep sessie is als volgt:

08:45 uur	Inloop
09:00 uur	Aanvang: introductie op onderwerp en voorstelrondje
09:15 uur	Start discussieronde stelling 1
09:30 uur	Start discussieronde stelling 2
09:45 uur	Start discussieronde stelling 3
10:00 uur	Start discussieronde stelling 4
10:15 uur	Start discussieronde stelling 5
10:30 uur	Conclusieronde en afsluiting

### Praktische informatie

Zoals eerder vermeld, vindt de focusgroep sessie plaats op het kantoor van Witteveen+Bos te Heerenveen.

K.R. Poststraat 100-3  
8441 ER  
Heerenveen

In bijlage I treft u een kaartje alsmede een routebeschrijving aan.

Bij vertraging of verhindering op het laatste moment kunt u telefonisch contact opnemen via 0513 64 18 00 of 06 21 39 20 06.



