

## Balancing of interests between the clients and contractors within infrastructure Innovation Partnership projects

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### Abstract

The aim of this paper is to identify and understand the tensions that can occur between the client and the contractors within innovation partnerships (IPS) procedures to present recommendations to ensure a balance of interests between the client and market parties. The IPS is a relatively new procurement procedure where the client and market parties agree to a long-term partnership in which they develop innovations together. Due to the novelty of the procedure, conflicting interests, the long contract duration and the dynamic environment, tensions and paradoxes are inevitable in IPS leading to delays and cost overruns. In addition to this, there is no scientific research done on how to deal with these tensions to ensure a balance between the client and market parties. This study uses two large-scale and real-life IPS infrastructure projects to research the tensions within IPS projects. The first case is IPS Amsterdam in which the municipality demands a new innovative product for the renewal of their quay walls. The second case is IPS Sterke Lekdijk where the water board uses the IPS to tilt the current innovations in the dike sector to a commercial applied level to use these innovations for future dike renewal projects. By comparing these cases, three dynamics are found that influence the balance in an IPS procedure, namely: the organisational structure, intellectual property, and the financial component. Within these dynamics, tensions were discovered. Examples of these tensions are the question of who should pay for the IP, setting up a cost-effective profit mechanism (IPS Amsterdam) and process control (Sterke Lekdijk). This research highlights several mechanisms that alleviate the tensions within the IPS procedures. These mechanisms are divided into six categories: contract provisions, relationships, digitalised tools, relational governance, knowledge, and competences. By comparing the results of the two cases it is found that the dynamics of an IPS and the dealing mechanisms are interrelated, and both play an essential role in developing a balanced environment and resolving tensions. A general conclusion is that the better the relationship, the quicker the tensions were resolved. Hence, the dynamics and mechanisms should be flexible and interchangeable so that a balanced environment is reached, and the building of relationships is promoted.

### Introduction

The construction sector is an important sector in the Dutch economy as it makes an important contribution to a good residential, working and living environment. Furthermore, the total construction sector in the Netherlands accounts for about 9% of the gross domestic product and generates more than 70 billion euros in production (BouwendNederland 2021). It is therefore odd that the level of innovation in the construction sector is low compared to other sectors and there is still a lot to be gained (Blayse & Manley 2004; OECD, 2010).

Out of the literature, many types of innovations are identified. Lenderink et al. (2019) distinguish between two types of innovation, which can be characterised as product or process innovation. However, in their research, Selvakkumaran & Ahlgren (2020) describe another form of innovation which differs from foregoing types, namely social innovation. Social innovation is made up of new ideas that meet social needs, create relationships, and form new collaborations. Hence, societal innovations put the focus on social needs that are typically overlooked. Furthermore, innovation can be classified according to the degree of innovation which is divided into three levels: radical innovations, substantial innovations, and incremental innovations (Lenderink et al. 2019). The first two degrees of innovation can be seen as exploratory innovation, this type of innovation carries a higher risk while the other type of innovation, incremental innovation, is an exploratory innovation that carries a relatively lower risk (Killen et al. 2019; Andriopoulos & Lewis 2010). Often companies must adopt both 'types', leading to tensions in management. This requires an approach with ambidexterity, meaning simultaneously exploiting and exploring innovation to receive long-term value (Killen et al. 2019).

One way to explain the low level of innovation in the construction sector is due to characteristics such as fragmentation and heavy client involvement. Characteristics like these make innovation difficult and therefore integration and partnering is needed to make the parties involved in the sector work together to achieve innovation (Winch 1998). In this regard, the innovation partnership (IPS) is particularly interesting. IPS is a relatively new procurement method by which a client utilises the knowledge of market parties and enters a long-term partnership to develop innovations together. Given that this could potentially be a good solution in terms of cooperation and the creation of innovation, we will expand on this later in the article. In addition to the

foregoing characteristics, the client also plays an important role in the degree of innovation in the construction sector, because if the client does not ask for it, it will not be built. This means that the main driver for the client to use a procedure like the IPS - and thus creating innovation - is in the situation that the required products are currently not available on the market (Loosemore 2015). On the other hand, the main driver for the market parties to create innovation is to gain financially and to create a competitive advantage through reputation and branding (Winch 1998). This misalignment of interests between the two parties may lead to tensions which in result also affect the degree of innovation that is achieved. Another factor that leads to tensions is that innovation is usually associated with higher costs as innovative procedures are more expensive. Public institutions must pay these costs at this stage of the innovation cycle, otherwise the innovation will not be developed (Lenderink et al. 2019; Edler & Georghiou, 2007; Ozorhon et al. 2014).

To promote innovation, new procurement procedures are developed, one of which is the IPS. The IPS procedure has three phases: the competitive dialogue phase, the research and development (R&D) phase and the commercial phase (Europe 2016). The competitive dialogue phase consists of a suitability assessment, a negotiation procedure, and agreements on intellectual property (IP). In the R&D phase the innovation is developed and in the commercial phase the innovation is purchased without a tendering procedure. Characteristic of the IPS procedures is that there is a lot of room for choices to be made by the client regarding the organisational structure, costs, and IP of the innovation. As a result, different IPS procedures may have the same name, but they can vary widely in terms of content. Also noteworthy is that a client can choose to incorporate a clause to end the partnership if it does not seem reasonable for any of the parties to continue the cooperation. The IPS has advantages over traditional procurement procedures because this type of procedure leaves room for innovation for the market and there is also visibly more room for interaction between client and contractor. After the R&D phase the innovation can be purchased without a prior tendering procedure. Aspects like these and the room for innovation and interaction that exist within the IPS, make this procedure more transparent compared to the other, more traditional, procedures. However, there are also some disadvantages as the long preparation and procurement time, depending on the level and degree of innovation. In addition, the choice of contractors is limited to the participating parties in this procedure, meaning that the solutions and ideas that are developed in the market can not be included in the IPS at a later stage (Pianoo 2021).

It is thus seen that innovation and partnering are accompanied by a series of tensions, competing demands, conflicts, contradictions, and dilemmas that lead to an environment of paradoxes (Alderman & Ivory 2007). The paradoxes and tensions could lead to an imbalance between contractor, which in return could reduce the efficiency of IPS procedures, making the procedure unable to serve the intended purpose for which it was created. These problems may be related to the fact that IPS procedures are completely new, and clients are accustomed with setting up traditional procurement procedures, but there are signs that indicate that the IPS procedure must be seen in a broader context, which in return raises more uncertainties.

In this research paper two major IPS infrastructure projects that are currently located in the R&D phase of the IPS are examined and compared to identify and discuss mechanisms that lead to tensions between the client and the contractor. For example, over who pays for the innovation being developed as this gives the market parties a competitive advantage.

Given the fact that little research has been done on IPS procedures, the primary aim is to understand the dynamics within an IPS that lead to tensions in the R&D phase to know what actions need to be taken to ensure a balance between contractor and client in current and future cases. The second objective is to uncover possible solutions to the tensions that will benefit both the client and the market parties. The third aim of this research is to contribute to the limited existing research on IPS procedures. This brings us to the research question that is central to this study: "How to balance interest between the client and the contractor within the innovation partnership in infrastructure?". The answer to the main question is found by finding the interests of the client and market parties, then the tensions within these interests are identified. Lastly the mechanisms are identified on how to deal with these tensions. The tensions and interests are identified by interviews and these results are compared between the two cases.

This paper starts by describing the background of previous research on the characteristics of the construction industry leading to a low rate of innovation. It then discusses partnering and IPS as a possible solution to this problem, followed by literature on tensions in innovation and partnering. The results section describes the findings of two real-life cases that examine the interests, tensions, and dynamics. Later in the results chapter the dealing mechanisms found in the cases are described. This provides an overview of the differences and shows how the choices made affect the process of the IPS. In the discussion section, the findings are analysed in relation to the theoretical framework. Based on the results and discussion the conclusions and recommendations are presented to further improve the relationship between client and contractor in IPS procedures.

## Background theory

### *Need for innovative contracts*

The construction industry is often described as a complex product system (CoPS). A CoPS can be characterised by aspects such as project orientation, input from temporary coalitions, high involvement of clients and many unique and interrelated relationships and elements (Winch 1998 & 2002; Blayse & Manley 2004). Another reason may be that the construction sector is a product-oriented industry rather than a repetitive one which makes optimisation difficult causing innovation in the construction sector to lag behind other industries such as IT and automotive (Winch 2002). In addition, the Dutch government saw competition as a stimulus for innovation, but due to the complexity of the construction sector, this rule is not applicable for the construction sector (Doree, 2004). These characteristics make it difficult to develop innovations to a higher technology readiness level (TRL) (Héder 2017). TRLs are indicators of the level of maturity of innovations and the system provides a common understanding of the status of the innovation. TRL consists of 9 levels; TRL 1 (idea level) is the lowest and TRL 9 (commercially applied level) is the highest (Héder 2017).

Industries innovate for the benefit of buyers, so companies use innovation to lower cost prices and increase the number of units sold. In the construction sector, the client usually assumes the role of the buyers, as it invests in the public environment. This means that innovation must be demanded by the client and delivered by the market parties (Loosemore 2015). Therefore, is the right contract form being essential to stimulate innovation. The build, own, operate and transfer procedures and IPS provide freedom for innovation and encourage integration by enabling partnering (Beach et al. 2005; Bresnen & Marshall 2000). Another factor by which the client can stimulate the market to develop innovations is by tightening specific requirements for innovation, thus demanding innovation and higher standards (Barlow 2000; Blayse & Manley 2004).

Rijkswaterstaat, together with McKinsey, have published a report on how to make the construction sector more vital. This report makes suggestions for revitalising the Dutch construction sector and three main components emerge from this analysis, namely: collaboration (equal partners and open culture), a financially healthy sector (two-phase contracts and fair risk sharing) and innovation and learning (programme approach) (Rijkswaterstaat 2020). IPS is ideally suited for promoting these aspects as this requires the parties involved to collaborate on a long-term basis which reduces risks and promotes relationships. However, given that there is not much known about IPS procedures yet, this is where the relevance of this research comes in.

### *Innovation through partnerships*

Miller et al. (1995) argue that integration in a CoPS is necessary for the construction sector to innovate. One method of promoting integration is partnering, which is a method for the client and contractor to work together to achieve separate but complementary goals. Partnering has benefits such as increased productivity, reduced costs, shorter project times, improved quality and increased client satisfaction compared to traditional methods (Beach et al. 2005; Bresnen & Marshall 2000).

Bygballe et al. (2010) describe a partnership as a long-term commitment between two or more organisations with the aim of achieving specific business objectives by maximising the effectiveness of each participants' resources. Construction projects are unique and each time there is a unique combination of contractors, engineers, and clients, making cooperation in construction difficult. The long-term relationship between parties during projects is thus crucial for innovation and should be encouraged as it enables learning and increases efficiency (Nam & Tatum 1997, Dubois, & Gadde, 2002; Dorée, & Holmen, 2004).

A bottleneck for innovation through partnerships in public procurement is that the client is generally risk-averse and directly responsible for failures. At the same time, the stakeholder group reaps the benefits of the innovative products and services that are procured. Risk management and collaboration is a solution to these problems, but these are often absent within the public organisation (Czarnitzki et al. 2020; Haeussler et al. 2012; Loosemore 2015; Ozorhon et al. 2013). Client leadership is seen as an important role in promoting innovation and should help abandon the focus on lowest price, as lowest price will lead to instability. It is also important to keep in mind that the rewards for innovation must come from the clients, being that if no one pays for innovation, it will not be made (Loosemore & Richard 2014; Blayse & Manley 2004; Doree 2004). A possible solution to this problem is presented by Chan et al. (2014). According to their research, this problem can be solved by mutual investments since this creates support from both parties which is necessary to achieve project success. In addition, it is important that parties entering a partnership have an innovative attitude and understand why things are done in a certain way to create support (Blayse & Maynley 2004; Rutten et al. 2007; Barlow 2000; Winch, 1998).

### *Paradoxes in innovation*

Globalisation, innovation, competition, and social demand create environments that are more dynamic and complex. In these environments, paradox theory becomes crucial to understanding and leading contemporary organisations (Smith & Lewis 2011). Lewis (2000) defines three overarching characteristics of a paradox. The first characteristic is that a paradox is a system with contradictory yet interrelated elements that exist simultaneously and persist over time. For example, managers must increase efficiency while promoting creativity, build individualistic teams, and think globally while acting locally. Second, paradoxes are constructed. Actors try to make sense of an ever-changing world and tend to simplify reality into polarised distinctions. And thirdly, paradoxes become apparent through self or social reflection that reveals seemingly absurd things.

When actors try to resolve paradoxes and tensions, they can become trapped in the reinforcing cycle that exacerbates tensions. The tendency is to resolve tensions and rationalise them. Yet in complex organisations, linear and rational problem solving is not possible (Lewis 2000; Smith & Lewis 2011). Smith et al. (2017) confirm and argue that paradoxes should not be seen as an exchange, but as interacting threads that continually define and inform each other over time. Paradox management involves exploring rather than suppressing tensions and accepting, confronting or transcending the paradox is seen as a solution to this (Lewis 2000). Manzoni & Volker (2017) argue that a paradox can be resolved by finding a win-win situation in which the best of both opposites is achieved.

That innovation involves a set of tensions, competing demands, conflicts, contradictions, and dilemmas is well known in the organisational literature (Smith et al. 2017). In most industries, long-term value is created by pursuing both incremental and radical innovation projects. However, incremental projects that exploit existing capabilities and radical projects that explore new areas require different approaches. To innovate, firms must develop capabilities for ambidexterity, meaning the ability to manage exploration and exploitation simultaneously (Smith et al. 2017; Killen et al. 2019). The research of Andriopoulos & Lewis (2010) suggests three specific lessons. The lesson is that paradoxes can both fuel and frustrate innovation. The second lesson is that managing innovation paradoxes is paradoxical in itself. The final lesson is that companies deal with paradoxes in different ways depending on the size of the company, illustrating the possibility of developing creative alternatives that fit different organisational settings.

Partnering is also seen as a solution to paradoxes but partnering itself can also lead to organisational paradoxes. This happens when organisations have inherent contradictions within them. Partnering and lowest-cost tendering often exist simultaneously. However, partnering should divert attention from lowest cost tendering which is often not the case (Alderman & Ivory 2007). In addition, culture is quickly abandoned when circumstances make it appropriate. Alderman & Ivory (2007) also show that contractors are vulnerable to partnering. Partnering sounds attractive, but the commitment is expensive, and it is a mask of power imbalance in the relationship between client and contractor. A contractor must adopt a critical and cautious attitude and coordinate his efforts in the partnership. Success depends on the continued commitment of the partner group, but this commitment depends on managers who are not involved in the partner group.

Samset & Volden (2015) highlight several paradoxes regarding partnering in construction that led to two problems, these are: 1) efficiency problems in terms of delays and cost overruns, and 2) more fundamental problems related to the strategic success of the project (choosing the wrong concept). Their paper demonstrates the importance of project governance to successfully complete the project. Project governance involves the process, system, and regulations that the funding party (client) must have in place to ensure that projects are completed successfully. Samset & Volden (2015) argue that many of the problems in large public investment projects are related to the analytical or political processes that precede the decision to proceed. Preparation on the client's side is therefore essential to reduce the shortcoming.

In addition, Demirel et al. (2019) highlight several mechanisms for dealing with tensions in partnerships. In their research, variations in public private partnerships (PPP) are seen as a cause for tensions which must be dealt with. The dealing mechanisms that have been found in this research are contractual provisions, relationships, relational governance, digitised tools, knowledge, and competences. Contractual provisions refer to the IPS contractual agreements as IP. Human relationships include the personal relationships between parties; relational governance in this study refers to project governance in the IPS organisations. Digitised tools refer to shared IT systems. Knowledge refers to tacit and explicit knowledge, while actor competencies refer to the skills of the project participants.

### **Research approach**

#### *Case studies*

Due to the novelty of IPS procedures, there is a great need for research on this topic. The literature identifies several dealing mechanisms to overcome the tensions with innovation and partnering, such as client leadership,

mutual investment, creating win-win situations, commitment, project governance and preparation. The chosen method for this research is to analyse two real-life infrastructure IPS projects to investigate the dynamics and dealing mechanisms within an IPS in practice through in-depth data collection and by making comparisons. Creswell (2013) and Gustafson (2017) state that case studies are not primarily focused on analysing the cases, but on exploring and understanding the subject leading to a greater and deeper understanding. And since so much still is unknown, I believe this is the best method to research this topic.

As mentioned, the IPS procedure consists of three phases. The scope of this research is limited to the R&D phase of the IPS procedures. The tensions, if any will arise in this phase since there is a high level of interaction between the client and contractor in this phase. The conditions prescribed in the tendering phase are considered fixed and it is not possible to propose changes to these conditions, whereas it is possible to do so in the R&D phase. However, when tensions arise due to the agreements out of the tendering phase, recommendations will be presented to ensure conditions for a balance for future R&D procedures.

In this paper, two practical cases are presented to explore the interests, paradoxes and tensions between client and market participants within the R&D phase of IPS projects. These projects are ‘Quay walls Amsterdam’ and ‘Sterke Lekdijk’. These projects will be described in greater detail the results section. For simplicity, ‘Quay Walls Amsterdam’ is coded as Case A and ‘Sterke Lekdijk’ as Case B. These two cases were chosen because they involve a large-scale real-life IPS project and being that there is no set procedure for an IPS, this leaves a lot of room for the client to make their own interpretation of the IPS. Because this leads to many differences between these IPS procedures, this makes for an interesting case study. For one sees that IPS procedures can be based on the same principle but vary widely in content. These two cases will be used for a comparative case study (Hartmann 2017). The two cases that will be compared in the context of this paper are similar in size, total budget and are in the same stage within the R&D phase. Table 1 provides a summary of the cases that is based on tender documents and interviews giving a first indication on how these cases are set up.

	QUAY WALLS AMSTERDAM	STERKE LEKDIJK
<b>BUDGET</b>	<ul style="list-style-type: none"> <li>Fixed</li> </ul>	<ul style="list-style-type: none"> <li>Open budget</li> <li>Fixed profit margin for market participants</li> </ul>
<b>TYPE OF INNOVATION</b>	<ul style="list-style-type: none"> <li>Product</li> <li>Process</li> </ul>	<ul style="list-style-type: none"> <li>Product</li> <li>Process</li> <li>Social</li> </ul>
<b>REQUESTED TRL START</b>	<ul style="list-style-type: none"> <li>TRL 1</li> </ul>	<ul style="list-style-type: none"> <li>TRL 6-7</li> </ul>
<b>REQUESTED TRL OFFER</b>	<ul style="list-style-type: none"> <li>TRL 3</li> </ul>	<ul style="list-style-type: none"> <li>TRL 6-7</li> </ul>
<b>AWARD CRITERIA</b>	<ul style="list-style-type: none"> <li>Fixed costs</li> <li>Scalability</li> <li>Impact on the environment</li> <li>Future value</li> <li>Collaboration</li> </ul>	<ul style="list-style-type: none"> <li>Innovation plan</li> <li>HRM plan + team assessment</li> <li>Financial management plan</li> </ul>
<b>INTELLECTUAL PROPERTY</b>	<ul style="list-style-type: none"> <li>Remains for the market parties</li> <li>The municipality has usage rights</li> </ul>	<ul style="list-style-type: none"> <li>100% for the client, or</li> <li>100% market parties if they pay and bear risks for innovation</li> </ul>
<b>PROJECT GOVERNANCE</b>	<ul style="list-style-type: none"> <li>Separated</li> </ul>	<ul style="list-style-type: none"> <li>Mixed</li> </ul>
<b>VALIDATION</b>	<ul style="list-style-type: none"> <li>Municipality</li> <li>Stakeholders (e.g., water board, asset managers)</li> </ul>	<ul style="list-style-type: none"> <li>Waterboard</li> <li>Stakeholders (e.g., HWBP, RWS, asset managers)</li> <li>Market parties</li> <li>(Process) external</li> </ul>

Table 1: Summary of the real-life cases

## Research method

### Data gathering

The aim of this research was to identify the factors in an IPS that led to tensions between the contractor and the client. To find the factors which, influence the balance between the client and contractor, this study began with a review of the current literature on topics such as innovation in construction, innovation in procurement, tendering and partnering and paradoxes in innovation. With this literature review a theoretical framework was developed serving as a first input for the interviews.

To identify the factors in an IPS that lead to either tensions or a balance between the contractor and client, first the interests of all the parties were identified to find what the motives are of each party. This allows to find possible tensions within these interests considering that the interests of the client and the contractor

may be opposed. The real-life data has been collected through interviews, document analysis and attending one project meeting in the period from January 2021 to June 2021. To construct validity, information has been collected from as many sources as possible (Creswell 2013, Yin 2014).

The documents that were used for the analysis were tender documents, programme plans, process plans, cooperation documents and construction reports. To gain more insight into the interests, tensions, and success factors, 23 interviews were held with project managers, contract managers, board members, innovation managers and technical managers. For the interviews, a semi-structured interview guideline was developed based on the theoretical framework, document analysis and first impressions out of the conversations with involved parties. The interviewees from case A were selected together with a project manager from one of the involved market parties and the interviewees from case B were selected together with the contract manager and board member. The interviewees were given a brief introduction to the study but the questions that were posed were not sent to them in advance as this left them no room to prepare their answers. This also ensured that the direction of the conversation could be monitored throughout, and it facilitated continued questioning. All interviews were conducted via digital meetings lasting one to one-and-a-half hours.

This research distinguishes not only between two cases, but also between the client and contractor. For case A, the client is coded as Amsterdam Public Agency (APA 1-3) and the contractor as Amsterdam Contractor (AC 1-9) and for case B, the principal is coded as Public Agency Sterke Lekdijk (SLPA 1-5) and the contractors as Sterke Lekdijk Contractor (SLC 1-6). The appendix contains the interviewees and the interview questions. To gain more insight, questions and opinions were submitted to my supervisor who is a project manager at one of the market parties. In addition, the participants were open to call or email to provide additional perspective through informal conversations that also have led to new insights.

#### Data analysis

The first step of the data analysis was to transcribe the recordings to scripts. This resulted in a first understanding of the main themes. The second step was to reread the scripts and highlight interesting sections. These interesting sections then were coded. The third step was to categorise these codes into groups based on the studied literature and appearances in the literature. Examples of these groups are interests and ambitions, IP, personal factors, project structure and tensions. And in the fourth and final step, the groups were divided into the following dealing mechanisms: contractual provisions, human relations, relational governance (in this research relational governance and project governance have the same meaning and are used interchangeably), digitised tools, professional knowledge, and actor competences. The dealing mechanisms are based on the research done by Demirel et al. (2019). There are many similarities in the aim and methodology in their research and this research, however the difference is that their research focuses on dealing with variations in the context of PPP procedures in construction. It is interesting to use this research because in PPP procedures the client and contractor also agree on a long-term partnership making the studies very similar in nature.

Yin (2014) states that data management is imperative in qualitative research. The data was managed using Atlas.ti and Excel. Atlas.ti was used to analyse and code the qualitative data according to the main themes. Excel was used to organise relevant documents, contact names of interviewees and other data that emerged during the interviews. To construct validity of the results, external experts were asked to give their point of view on the subject. The experts were presented with a brief presentation on the study and were therefore able to assess the research results. In addition to this, some of the interviewees were asked to read the draft of the paper to check whether the made assumptions are correct.

The paragraph discussing the results explains the cases in more detail and reveals the interests and tensions that are at play in these cases. As indicated earlier, the interests of the client and the market parties were first identified to find the motives of both parties. Then the tensions within these interests are identified by finding the conflicts in these motives. In the first section of the results, the cases are described separately. After comparing the interests and tensions of the projects it was possible to find the dynamics of an IPS which are seen as the factors leading to a balance or tension within IPS procedures. After the dynamics, the dealing mechanisms that have been found are described comparatively to show the differences and similarities between the cases. At last, a summary of the results is provided to provide an overview of the results.

## Results

### *Innovation partnership quay walls (Case A)*

The municipality of Amsterdam has a problem with the rapidly deteriorating state of the city's quay walls. The city has 200 kilometres of quay walls that are at the end of their technical lifespan and some of which are currently on the verge of collapse. The traditional method of renewing the quay walls is very expensive, causes

hindrance and the renewal rate is too slow. If the traditional method is used, the whole city will be locked up because the canals and streets will be blocked by the construction activities. The complexity in Amsterdam is high due to the many conflicting interests of stakeholders and the density of the city. However, the client has set high ambitions to achieve innovation, costs reduction, halve the hindrance and halve the construction time.

To achieve these ambitions, the municipality uses the IPS procedure as an instrument to develop the innovation together with market parties. The innovation had to be developed from TRL 1 to TRL 9, which entailed a great deal of uncertainty for the market parties. The municipality of Amsterdam is requesting an innovative method for renewing the quay walls which is achieved through product and process innovation. The IP of the innovations lies with the market and is seen as an incentive for market parties to participate in the project. This means that the market parties are primarily responsible for investing in the R&D of the innovation and that the profit from the commercial phase should outweigh the initial investment.

Sixteen contractors signed up for the IPS procedure, these sixteen parties had to deliver a vision on innovation and based on this vision, six parties were selected. These six parties then had to discuss and develop their innovation to TRL-3 applied to a fictitious case. Three of these parties were then selected based on the best value plan and could proceed to the R&D phase of the IPS. Entering the R&D phase, the three contractors received a compensation for the development costs. If the R&D phase is completed, the commercial phase starts in which the municipality buys the innovation for 4 years with an extension to 8 years. To successfully complete the R&D phase, the market parties must go through three phases that end with a validation moment carried out by the municipality. The final phase of the R&D phase is a pilot phase in which the innovation is built and tested within the city. This is the final phase before moving on to the commercial phase.

### Interests

The municipality of Amsterdam has three main interests and ambitions for using an IPS. The main reason is that there are currently no products or services available to renovate the quay walls in a way that matches the municipality's high ambitions to renovate the quay walls at a faster pace and in a relatively nonintrusive manner. This means that a radical innovation is demanded to develop a new product with TRL 9, coming with a high level of uncertainty. The second interest found in the interviews was that the municipality wanted to use the knowledge of market parties because the market generally has more knowledge to develop the innovations. APA1 describes: "If we did it the traditional way, we would get a lot of resistance due to the complexity of the environment. I am convinced that the market can come up with very good solutions and I have faith in that". The third interest was that the municipality wanted to procure and develop innovations on a large scale, so the IPS procedure works well because of the long-term nature of the contract form. APA1 on this: "By establishing long-term cooperation, this is a good start, wanting to move towards 8 years of cooperation".

The most frequent mentioned interest by the market parties was making profits due to the long-term partnership. For case A, the profit mechanism resulted from the promise of a long-term workflow and continued ownership of the IP of the innovation. Therefore, the contractors think that the investments made will benefit them in the long run. The other interests were mentioned less frequently. These interests were, reputation and branding, becoming familiar with IPS procedures because market parties see a future in this type of contract form. AC2 summarizes: "8 years of profits due to the work-flow and publicity. Publicity is of course, related to reputation since you want to be innovative as a company".

### Tensions

The tension most frequently mentioned in the interviews between the client and contractor lies in the fixed budget and the uncertainty about the profitability for the market parties. The fixed budget was set by the client based on the average prices of the last 10 traditional quay wall renewal projects. However, at the time of setting the budget, the innovations were at TRL 2-3. This means that the innovation had not yet been developed to a level at which it is reasonable to agree on a price due to the uncertainty. AC1 said the following about this: "In the award phase, we said we could do it for the fixed amount; later, with more concreteness, our calculated price went by 20%". This led to a lot of uncertainty among the market parties, and two of the three market parties had extreme difficulties with these aspects as it complicated the profitability of their business cases. Due to this, they were unsure if the investment would be profitable or not and if they should continue or withdraw from the project. The market parties want to recoup the investments of the innovation on this project, so they do not take future profits on different projects into account. The tensions were removed by the client by five folding the compensation for the development costs improving their business cases.

The budget also led to tensions as to the question of who should pay for the cost of the innovations. Interviews show that the municipality of Amsterdam does not want to fully compensate the development costs

for the total innovation because the IP lies with the market parties, and they can use the innovation to make a profit on different projects. However, some managers of the contracting parties would like to see a more equitable compensation for the development of the innovation.

Furthermore, the IPS procedure is new for all parties involved and this also leads to tensions. Most of the interviewees revealed that the preparation of the municipality of Amsterdam was not at the desired level. This is because on the client's side, there are many conflicting interests that complicate the process and preparation. The client should make compromises for these interests internal before communicating towards the market parties. AC2 confirms this: "First of all, the client has to make sure that all interests are equal within their organisation. Sometimes the interests of the specialists are not equal and that is very frustrating". This fact led to uncertainty because, due to the conflicting interests, it is not certain whether sufficient workflow can be guaranteed to the market parties. This led to a lot of negotiation and efficiency decreases, leading to delays and cost overruns. In addition to the preparation, the client did not draw up a project governance plan because they wanted to let the relationships develop on its own. This led to the underdevelopment of the relations between the market parties and client. In addition, the interviews showed that the covid-19 pandemic even further complicated that the relationships were not being developed to the desired level.

### *Innovation partnership Sterke Lekdijk (Case B)*

In the Netherlands, a national programme for dike reinforcement, the Hoogwater Beschermings Programma (HWBP), is ongoing. HWBP is an alliance of Rijkswaterstaat and a union of the water board in the Netherlands. This programme focuses on strengthening the dikes because of more intensive rainfall over the years and deteriorating state of the dikes. In the Netherlands, the dikes are owned by the water boards. Case B is managed by water board Hoogheemraadschap Stichtse Rijnlanden (HDSR).

For case B, the HWBP is the main financier. Many dike innovations remain stuck at TRL 6 or 7 because these innovations are not tested on a large scale and asset managers hesitate to implement them due to the uncertainty of the functionality. The IPS is used in this case to tilt the innovations to TRL 9 so that these innovations can be used in future HWBP projects. Another reason for HDSR to use the IPS is because of the complexity of interests and with this form of contract the interests can be embraced, thus arising to a win-win situation for the parties involved.

HDSR uses product, process, and social innovation. Social innovation in this case is attitude and behaviour aimed at cooperation within the project organisation and supply chain. This is seen as an essential condition to achieve the project objectives. A condition for social innovations for case B is, for example, a fair compensation for the tender process for every market party so that in return the water board could receive the real cost prices where these are normally incorporated in the unit prices later in the process. In this way, the water board has insight into the actual costs which is important for the open budget. Social safety is also stimulated by social innovation, the participants must feel safe in order to share information and knowledge with the other market parties as these companies are competitors on other projects.

The contractors interested in case B were selected on the bases of their experience in dike projects, experience in developing and implementing innovations, sustainability in other projects and knowledge of process and information management. This left HDSR with six market parties. The six market parties had to deliver an innovation plan, financial management plan and a human resource (HRM) plan in which they had to work out how they would cooperate and ensure that the designated experts remain involved in the project. In addition, the six contractors had to work on an assessment with HDSR to see how the cooperation between the contractor and the water board went. The three remaining market parties that continue have developed the project governance and ambitions together with the client, creating support among all parties involved. In addition, the market parties will receive a profit margin providing certainty for the market parties. The R&D phase of the dike consists of two phases, a plan development phase followed by a realisation phase in which the dike is constructed. At the end of the development phase, the budget is based on consensus. Once the realisation phase has been completed successfully, the market parties move on to the commercial phase.

### Interests

At case B, three main interests were also found for HDSR. The interviews revealed that the main reason was that there are many known dike innovations, however not applied on a large scale because of the conservativeness in the dike sector. The IPS is used to tilt innovations from TRL 6-7 to TRL 9, meaning that the innovations are developed on incremental levels leading to low levels of uncertainty. The innovations and learnings from case B will be applied to other dike reinforcement projects for the HWBP in the future. It is therefore important that the client remains IP-owner because the client wants to use the innovations in the national HWBP programme.



The last reason is to use the extensive knowledge of the market parties with the aim to create a continuous learning cycle between the market parties and the client leading to an increase in efficiency and cost reductions.

For case B, the main interest mentioned by the market parties was also making profits. The profit mechanism for the market parties lies in the continuity, fixed profit margin and the low risk due to the incremental innovation as the innovations are already at TRL 6 or 7. SLC5 states: "The contractor wants to make a profit, but it is more than that. It is more about continuity than profit, but for continuity you need profit margins". To a less frequent extend, the contractors mentioned reputation and branding, being an innovative company, competitive advantage and becoming familiar with IPS procedures because market parties see a future in this type of contract form. However, these aspects are all interrelated with continuity and profits.

### Tensions

As mentioned, case B has developed a project governance structure with known responsibilities, however, a finding from the interviews by the market parties was that the procedure sometimes appears cumbersome and rigid. There are many process requirements that the market parties must meet, which is why the process of the IPS is given as a cause of tension. SLC1 said the following about this: "The process requirements are perceived as heavy leading to a strict procedure, however, it is also necessary with innovating in this kind of process".

Another tension has been found in the subsidies which HDSR must receive from the HWBP. In the absence of a fixed budget, it remains unclear whether the project remains within the limits of the subsidies provided by the HWBP, so HDSR does not really have full control on the budget. The last tension found was that there is an area of tension within the supply chain regarding the IP of the innovations; the innovations already start at TRL 6 or 7 but some of these innovations are developed to that level by external suppliers. This is a business model for these suppliers, so they are very reluctant to give the IP to the HWBP. The HWBP wants to be given a licence to use these IP right to further the develop the innovation at TRL 6-7. The idea is that the innovation will be publicly usable, and thus the suppliers can use these innovations.

### *Dynamics within the IPS*

By analysing the findings surrounding the interests and tensions, I was able to identify the dynamics between the client and contractor within an IPS. This study showed that there are three main components in IPS procedures that either lead to a balance or tensions. These components are seen as the main dynamics within an IPS procedure and are as follows: the organisation of the IPS, the IP, and the financial component.

The organisation includes aspects of relationships, project governance, knowledge, and competences of the team members. This dynamic is of great influence on the relationships within the IPS procedure, and if not properly established this leads to great tensions. These dynamics are determined before the start of the procedure, however these are the conditions for the R&D phase so this has to be taken into account with setting up the procedure in order to strengthen the relationships. The IP is also seen as a dynamic for the client, the choices made around the IP can lead to a better relationship when the compensation is seen as fair to both parties. Basically, the IP can go to the client or to the market parties. In the case that the IP goes to the client, then the development costs should be paid fully by the client. However, when the market parties receive the IP mutual agreements should be made since the market parties are hesitant to invest when it remains uncertain whether the development costs can be recouped. The financial aspect is also important for the relationship. If this is perceived as unfair and unreasonable by the market party, this leads to tensions as the market parties will then be reluctant to innovate. So, it is important that the financial aspect is cost-effective so that stable financial situations are guaranteed.

Figure 1 illustrates how these mechanisms are interrelated. Furthermore, the choices that have been made are shown in figure 1 to present a better understanding of the differences between the cases. Case A is represented by red and case B is represented by blue.

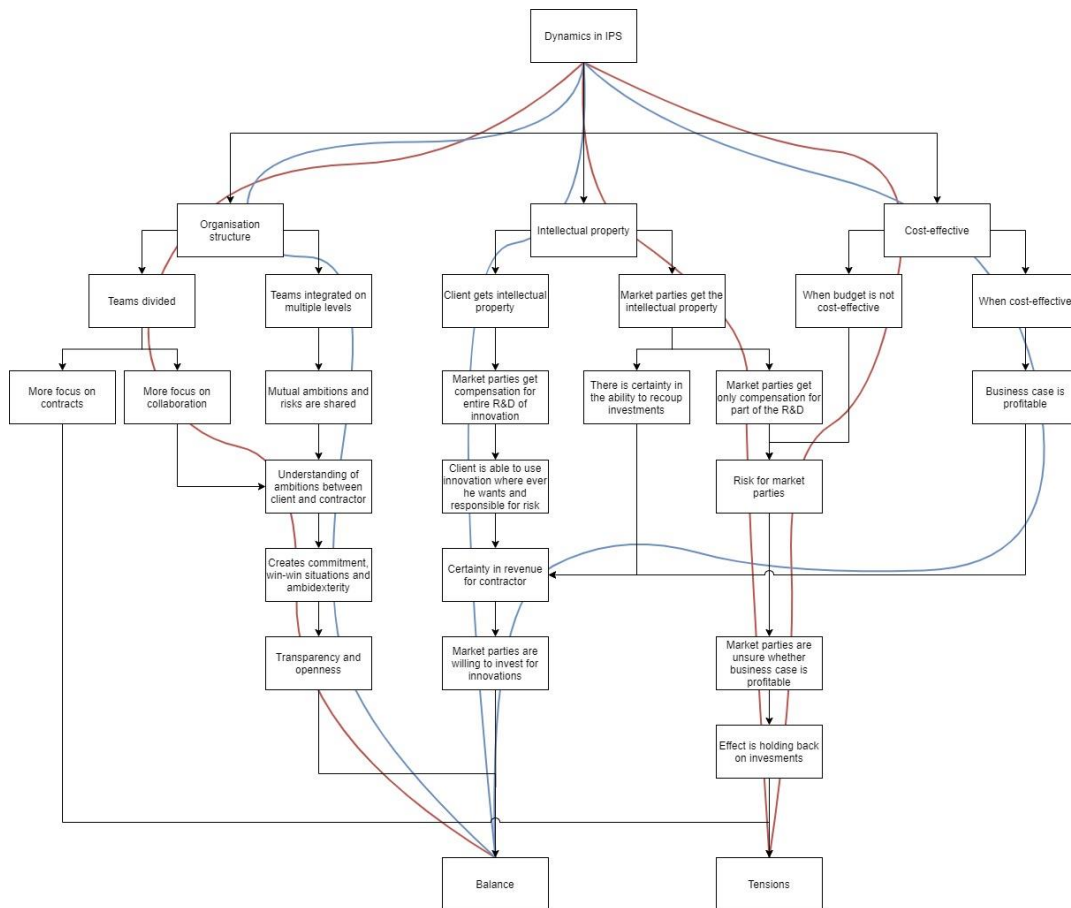


Figure 1: Main dynamics of IPS (red case A, blue case B)

## Dealing mechanisms

### Relational governance

Both projects make use of a standardised Integrated Project Management (IPM) model within their project governance. This model recognises the integration of different management functions (project manager, stakeholder manager, technical manager, contract manager, and manager of information and control) into one integrated project team. In case A, the IPM model was used on the client's and contractors' side. At case B, project governance came about in a different way in which it consists of three levels. As can be seen in Figure 2, the organisational structures are quite different, which affects the relationships within the project. In this figure, the blue roles are filled by the client and the green roles are filled by the market parties. Case A has a flat organisational structure, with the client and three market parties working as separate entities, except for the technical managers who are provided by the client to the project team. The municipality opted for this flat structure because they wanted to let the cooperation run its course, leading to a slow, poor preparation and no real cooperation between the entire project organisations. It must be noted that due to the Covid-19 pandemic the relationships could not really evolve, which is why this needs to be nuanced somewhat.

As mentioned, case B is divided into three mixed teams, which are all on a different level. In addition to this, each team includes delegates from both the client side and the market parties. The project team is responsible for the plan development phase and the realisation phase of the dikes. The programme team is responsible for monitoring the process and the knowledge at a tactical level. Lastly, the management team supervises cooperation at the strategic level, validates, takes decisions, and monitors the shared vision. For case B roles and responsibilities are divided between the market parties and the authorities. This results in an understanding of each others' processes and culture, resulting in support and respect between the parties. The client, together with the market parties, have developed mutual ambitions leading to commitment and by doing these relationships were strengthened. This also creates a great synergy between the market parties and the environment to learn from each other.

Thus, one can see from these differences that a project governance structure where roles and responsibilities are divided between clients and market parties enhances the relationships as it promotes trust and creates understanding.

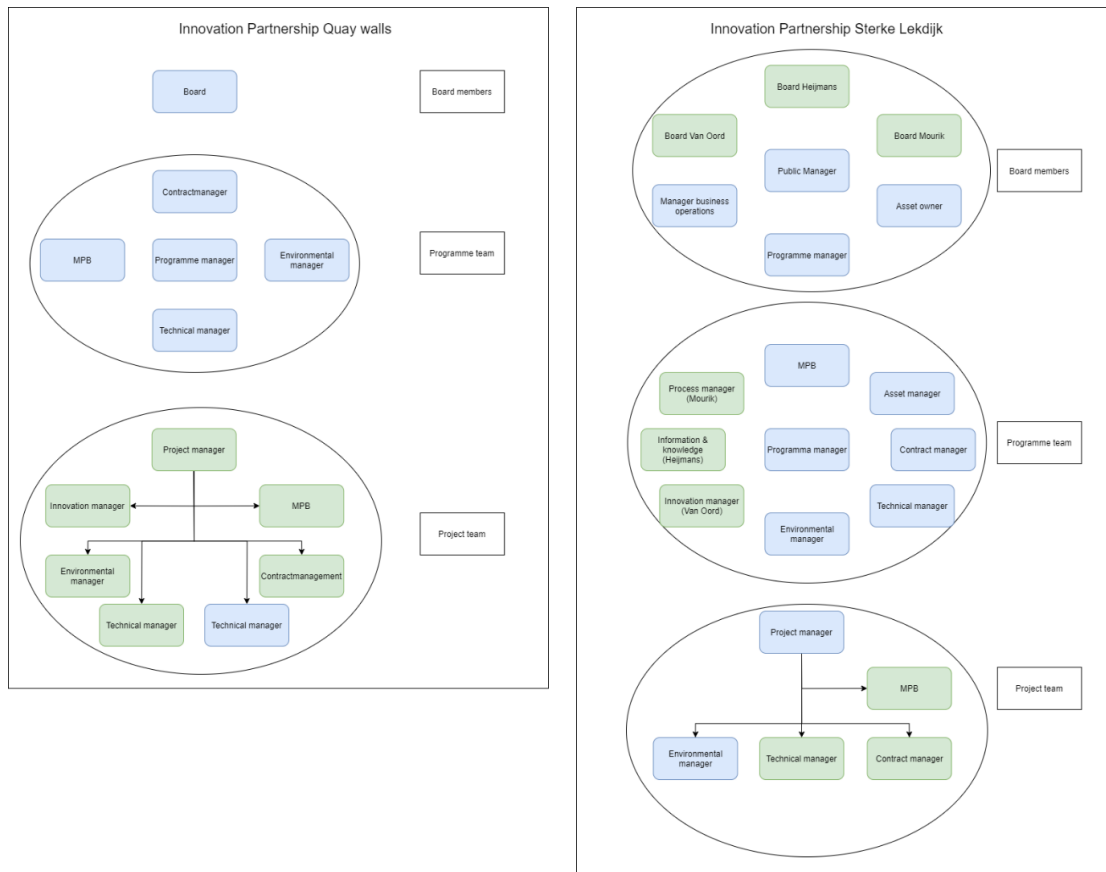


Figure 2: Project governance case A and B

### Contractual provisions

There is no specific law governing IPS procedures, meaning that the client can make their own decisions about the content of this. The main mechanisms in which the client can make choices regarding the contractual clauses are the agreements on the budget, the IP, and the underlying procedures.

There are major differences in the contract provisions and the R&D phase between the two cases. For instance, the municipality of Amsterdam has set a fixed budget at the beginning of the tendering phase. The choice for a fixed budget has been made to have control, exclude price competition and because the IP would remain with the market. APA1 said: "we have set a fixed budget based on 10 historical renewal projects, we don't want any price takers on this project, and we are looking for a fair budget that is high enough to include innovation". The IP is seen as an incentive for the market parties to participate in the contract procedure. This means that the market parties also bear the risks of the investment and for the proper functioning of the innovation. The fixed budget did not cover all development costs and together with the risks made the business case uncertain for the market parties. This led to some tension, but through good negotiation this was solved. APA2: "We subsequently amended the contract because we also want a partner who earns a good living. That is why we drew up the compensation measures, that came about because we listened well to each other".

On the other hand, HDSR did not set a budget at the start of the IPS but opted to work with an open budget and a fixed profit margin. This was done because the market parties had to hand over 100% of the IP to the client. SLPA1 gives an example: "Note that IP here has a somewhat different meaning than many people know. It is about the right to further develop an existing idea. As for all new IP to be acquired (in the project), this will be paid for by the client and will thus become 100% of HDSR, with all parties involved getting a licence for it immediately". By doing so HDSR could ensure that the knowledge is publicly usable and the advantage for the contractors lies in the first-user advantage. Pure IP does not mean much unless you have a patent. If innovators have a patent, they do not necessarily have to transfer it to HDSR, they can also give the water board a licence to use it and continue development. SLPA1 says: "If you want to use your patent commercially, you can, but you have to pay the development costs yourself and you are liable for the proper functioning of the innovation, which is an insurmountable obstacle". In addition, HDSR gave a significant tender fee to get the transparent cost prices for the open budget. SLPA4 said the following about this: "We also included a tender

cost allowance so that we could get radically transparent cost prices. Normally the contractor incorporates these tender costs into the cost prices, so this makes it fairer. It is never 100% cost recovery, but we do more this way than in other tenders. All 6 parties got it. We see this as a social/process innovation reducing the opportunistic behaviour". This indicates that social innovation can be interpreted very broadly, however helps with promoting the relationships.

Figure 3 shows the differences of the R&D phase within the two IPS procedures. For instance, the R&D phase of case A consists of three phases whereby each phase is used to tilt the innovation to a higher TRL. In addition to this, the market parties were validated by the municipality at the end of each phase. In the beginning this was new for the client and market parties, and this sometimes led to tensions given that the municipality sometimes had the capacity as a cooperation partner but other times as the validator of the documents. An example from APA4: "In phase 2.1, the municipality rejected our plans 2 days before the deadline, causing some tension. But thanks to good negotiation, this did not happen again, and we learned". In the pilot phase, the innovation will be built within the municipality of Amsterdam. When this phase has been successfully completed, the market parties enter the commercial phase in which the parties have four to eight years to work in the municipality of Amsterdam. Some tensions arise around this phase because it remains unclear whether the market parties will receive sufficient workflow to be profitable. The client has some internal difficulty with preparing for this workflow because of the conflicting interests, but after negotiation a conditioning programme is set up that should enable the market parties to work on more projects.

The R&D phase in case B consists of two phases: a plan development phase (2.1) and a realisation phase (2.2). At the end of phase 2.1, the price per dike segment will be determined, meaning that an agreement on the price will be made when the risks are known. The development phase is carried out in cooperation and SLC2 gives an example of why this contributes to the low risk: "Moreover, many risks are eliminated because discounting only takes place when the risks are clear". And client SLPA4 says: "The advantage is a joint design, so you can't go back later". Another reason why this project is low risk for the market parties is that case B uses innovations that are already at TRL 6-7. In the realisation phase, the project teams implement the innovations in the dike segments and, once this phase has been completed successfully, the market parties can move on to the commercial phase. In the case of B, validation is done by the management team using consensus. In addition to this, the process requirement is validated by an external party, which contributes to a reduction of tensions.

These findings indicate that validation should be performed mutually and/or externally when developing innovation through an IPS procedure. Another interesting difference is that the market parties for case A had to invest significantly more resources for the tender phase compared to the market parties for case B. This is related to the fact that six market parties of case A had to develop their innovation to TRL 3 before they were awarded the project whereas the market parties of case B did not have to invest resources in the development of innovations before the selection of the market parties.

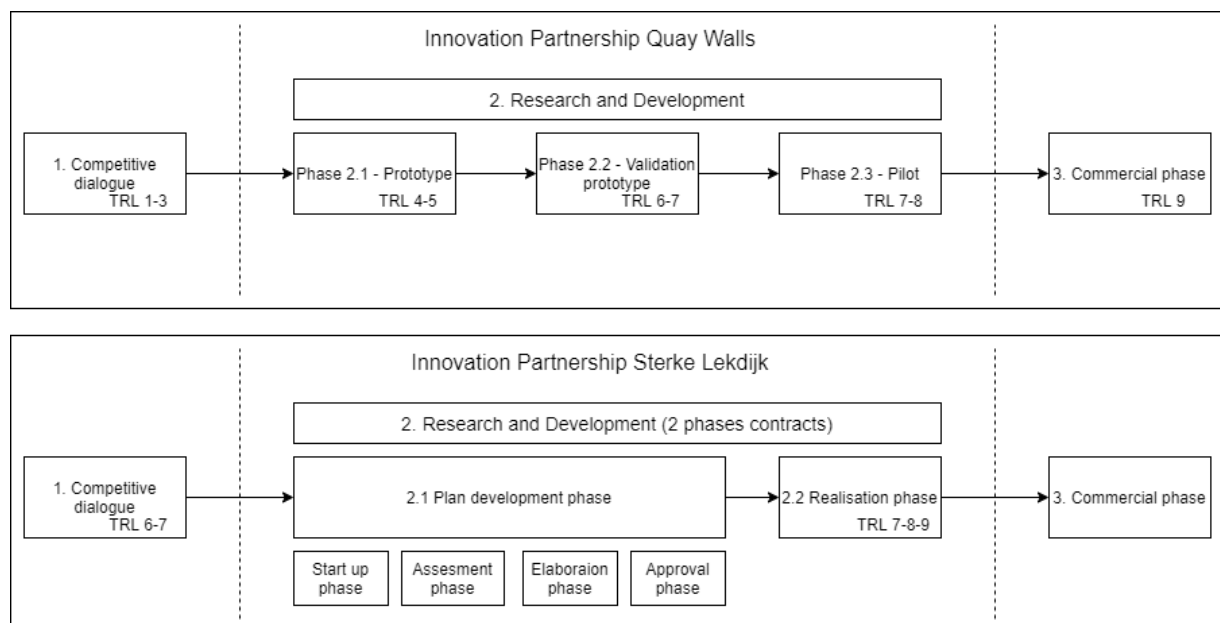


Figure 3: Process approach R&D phase case A and case B

### Relationships

One of the most frequently mentioned methods of overcoming tensions in the IPS was to engage in conversation and put yourself in a vulnerable position. This created open and transparent relationships between the client and the contractors. By increasing openness between client and contractors through knowledge sharing via digitised tools and by encouraging cooperation, it is expected that tensions can be better resolved on both sides. Another important aspect for strengthening relationships are the competences of the involved parties as this increases the understanding of cooperation. By cooperating, added value can be generated instead of losing value through contractual battles. A finding for both cases was that the contract is used as a basis, but tensions are resolved through negotiation and relationships. APA2 says: "It is like living with your partner, you have a strong bond, but agreements still have to be made".

Workshops were used in both projects to strengthen relationships. In addition, an interesting finding was that at least one or two of the client-side management positions in both the cases had experience on the contractor side, leading to an understanding of the market party's interests and processes. This led to more trust, openness, getting to know each other and a mutual understanding.

The interviews revealed that two of the three market parties in case A had difficulty with the profitability of the business case. However, because of the good relationship between the parties, this could easily be brought up resulting in action being taken by the municipality in the form of five-folding the compensation for the development costs and bonuses. This made it possible for the market parties to cover a significant amount of the investment costs which made the business case cost-effective and lowered the risk.

An important difference between the projects was that case B focussed strongly on relationship and cooperation aspects as selection criteria. The market parties had to do a cooperation assessment and deliver an HRM plan. During the assessment, the market parties were evaluated by using cases to see the extent to which they were able to cooperate and recognize the interests of other parties. In these cases, the market parties had to solve problems together with the client. Based on the HRM plan, the assessment looked at how the market parties viewed cooperation and how they would keep the knowledge within the team. This created an environment in which cooperation was seen as the norm and tensions were resolved in a mutual manner.

This shows that selecting partners based on competences, collaboration and understanding promotes relationships and thus the extent to which tensions are resolved. These findings indicate that relationships play an essential role in resolving tensions and that the right people and teams at the right place are essential for building long-term relationships in IPS procedures.

### Digitised tools

For this dealing mechanism, there is a big difference between the two cases. In both cases, BIM is used as a tool to communicate about the design. In case A, BIM is only used within the market parties and not specifically shared with all parties involved, whereas the BIM model for case B is accessible to all parties involved.

Case B also uses cloud systems for information and knowledge management and as a system engineering tool in which the processes are managed and validated. In doing so, information and knowledge is exchanged, thus promoting learning and trust within the project organisation strengthening the relationships. SLPA4 gives an example of this: "We are able to look behind the scenes of the other parties, creating trust. We use the contractors' systems, and they use ours. That makes us transparent to each other. We work together in a system".

Digitised tools in which parties can work together and share documents are thus essential for promoting transparency and creating mutual understanding. In return this helps with the building of relationship and thus resulting in the dissolution of tensions.

### Knowledge

Knowledge also played an important role in overcoming tensions because the parties knew the importance of the greater good. The market parties had to understand the concept and value of the IPS procedure to realise that this form of contract is not a typical procurement method. Experience with non-standard forms of contract also played a role, according to AC5: "We are good at non-standard forms of contract. We have more of our own ideas about how to interpret them. We saw opportunities". Another example by SLC5: "We are enthusiastic about the IPS and two-phase contracts. We go into the R&D phase together and really think about the contract".

Expertise was also mentioned, but this is very different for both cases. In case A the knowledge was more focused on innovation as the client wanted to develop a new product from TRL 1 to TRL 9. For example, one market party has extensive knowledge about the operation of the machine required for the innovation, reducing uncertainty in the development and operation of the innovation. Case B on the other hand, focused

more on information and knowledge sharing and processes. SLPA5 mentioned the following for knowledge sharing: "Create conditions at the front end so that parties are willing to contribute IP and share knowledge".

This shows how the two cases approached knowledge differently. Case A focused on the development of new products and thus needed parties with knowledge on producing innovations. Case B focused on collaboration and information sharing and thus needed parties with knowledge on HRM, information sharing and requirement processes.

### Competences

The interviews revealed that competences play an important role in overcoming tensions and strengthening relationships in an IPS. Competences can be seen as behaviour and attitude towards the other parties involved. This is important as IPS procedures require a new way of thinking compared to the traditional contract, so the IPM teams need to understand the concept and value of an IPS procedure. This also meant that the board of the clients and market parties had to understand the concept of an IPS procedure, as these parties are the main funders. This was done mainly by using the theory and an example given by SLPA1: "We drew up this strategy based on the theory and created support for it within the water board".

The interviews showed that the contractors do understand the tensions and the new contract procedure, for example AC3 stated: "Of course there are tensions, but that is also very normal, you have to talk that over with each other. It is an illusion to think that it will go well the first time". The contractors for case B also showed understanding. SLC6 for example mentioned: "We have to make ourselves vulnerable. The team has to get serious and solve real problems instead of getting stuck in theory". This shows that the parties know how to act to overcome tensions.

For both cases, the client also showed great leadership and commitment to the success of the project. For example, AC1 stated: "I was surprised by the team and the approach of the municipality of Amsterdam. They dared to think differently than a client usually does and to take more risks. That shows commitment" and AC7 said: "Yes, the package of measures really shows commitment. We suddenly received 5 times as much compensation. I was also surprised by the team from the municipality of Amsterdam, the team consisted of young members who all showed that they really wanted to make this work". SLC1 mentioned: "The client talks to me every two weeks about progress and shows me the internal processes within the client's organisation. This creates respect because I know that I understand the client much better". The project governance of case B contributes to this because the roles of client and contractors are divided among the organisations, creating involvement. This also created ambidexterity because the managers of the market parties had to fulfil roles of the client and vice versa, leading to an increase in understanding. At the same time this allowed the organisation to exploit and explore the innovations.

Another point that was often mentioned in the interviews was the innovative attitude of the companies. This innovative attitude is very important in an IPS procedure: if the partners do not have an innovative attitude, the understanding of these companies is not at an adequate level. For example, SLC6 mentioned "We don't apply for patents anymore but let go of everything. That is more important to us. You have to stay ahead of the competition and keep developing". AC5 remarked: "If you want to make money as an organisation, you also have to want to be innovative". This shows that the companies involved all have innovation as a strategy, which is also reflected in their culture.

Competences are important for the success of the IPS procedures because this procedure like IPS requires a new way of thinking and understanding. Managers should show leadership qualities and courage to encourage the project teams leading to strengthening of the relationships.

### *Summary of results*

The results confirmed that there are many dynamics within the interests of the parties involved in an IPS procedure that led to tensions, but that these can also be overcome by certain dealing mechanisms. The study also shows the dynamics within an IPS procedure leading to different outcomes. The results are presented in Table 2 using a top-down method, meaning in this study that the highest bullet-point per segment was mentioned most frequently mentioned during the interviews. The bullet-point standing lower were mentioned to a lesser extent. The dealing mechanisms are not set up in a hierarchical order. As there are also similarities between the cases, the differences are marked bold to give a clear representation of what distinguishes the cases.

	QUAY WALLS AMSTERDAM	STERKE LEKDIJK
INTEREST (CLIENT)	<ul style="list-style-type: none"> <li>• There are no existing methods and products that meet the ambitions</li> <li>• The municipality wants to develop innovations and purchase on a large scale</li> <li>• Using the knowledge of the market parties</li> <li>• Long-term relationship</li> </ul>	<ul style="list-style-type: none"> <li>• Innovations at TRL 6-7 that require further development</li> <li>• Client remains IP owner and wants to use the innovations for more HWBP dike projects</li> <li>• Using the knowledge of the market parties</li> <li>• Long-term relationship</li> </ul>
INTEREST (MARKET PARTIES)	<ul style="list-style-type: none"> <li>• <b>Making a profit through long-term workflow and keeping ownership of IP</b></li> <li>• Long-term continuous workflow for learning</li> <li>• Reputation and branding</li> <li>• Being an innovative company, competitive advantage</li> <li>• Familiarise yourself with IPS procedures.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Long-term workflow, fixed profit margin, low-risk project thanks to two-phase contracts and incremental innovation</b></li> <li>• Long-term continuous workflow for learning</li> <li>• Reputation and branding</li> <li>• Being an innovative company, competitive advantage</li> <li>• Familiarise yourself with IPS procedures</li> </ul>
TENSIONS	<ul style="list-style-type: none"> <li>• <b>Tension between client and contractor due to fixed budget and uncertainty about profit</b></li> <li>• <b>Tension between client and contractor, who pays for the innovation in terms of cost and risk</b></li> <li>• <b>Poor preparation and organisation within the client's side organisation as IPS is the first time for the municipality, leading to tensions</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Long, cumbersome, and rigid process due to the complexity of the process requirements</b></li> <li>• <b>Tension between water board and HWBP due to uncertainty about staying within budget because of the open budget</b></li> <li>• <b>Tension in the supply chain between contractor and supplier due to the "handing over" of IP</b></li> </ul>
DEALING MECHANISMS	<ul style="list-style-type: none"> <li>• Relationships <ul style="list-style-type: none"> <li>○ Putting themselves in vulnerable position</li> <li>○ Fairness and reasonableness</li> <li>○ Shared vision of cooperation</li> <li>○ Shared workshops</li> <li>○ People in key positions know each other</li> <li>○ Openness and transparency</li> <li>○ Understanding each other</li> </ul> </li> <li>• Contractual provisions <ul style="list-style-type: none"> <li>○ <b>IP stays with the market</b></li> <li>○ <b>Incentive to make profit by innovating</b></li> <li>○ Cooperation agreement</li> <li>○ <b>Client gave compensation and bonuses to the market parties</b></li> </ul> </li> <li>• Relational governance <ul style="list-style-type: none"> <li>○ Clear responsibilities and roles</li> <li>○ Continuous learning within the market</li> </ul> </li> <li>• Digitised tools <ul style="list-style-type: none"> <li>○ <b>BIM model within market parties</b></li> </ul> </li> <li>• Knowledge <ul style="list-style-type: none"> <li>○ Market parties have a lot of knowledge about innovation</li> <li>○ Understanding the contract</li> </ul> </li> <li>• Competences <ul style="list-style-type: none"> <li>○ Leadership, social and communication skills</li> <li>○ Commitment</li> <li>○ Dealing with conflicts and tensions</li> <li>○ Innovative attitude</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Relationships <ul style="list-style-type: none"> <li>○ <b>HRM plan</b></li> <li>○ Putting themselves in vulnerable position</li> <li>○ Fairness and reasonableness</li> <li>○ Shared vision of cooperation</li> <li>○ Shared workshops</li> <li>○ People in key positions know each other</li> <li>○ Openness and transparency</li> <li>○ Understanding each other</li> </ul> </li> <li>• Contractual provisions <ul style="list-style-type: none"> <li>○ <b>IP remains with client</b></li> <li>○ <b>Low risk for market player due to two-phase contract</b></li> <li>○ Cooperation agreement</li> <li>○ <b>Fixed profit margin</b></li> <li>○ <b>Open budget</b></li> </ul> </li> <li>• Relational governance <ul style="list-style-type: none"> <li>○ <b>Clear and smart organisational structure</b></li> <li>○ <b>Mutual vision</b></li> <li>○ Clear responsibilities and roles</li> <li>○ Continuous learning between parties</li> </ul> </li> <li>• Digitised tools <ul style="list-style-type: none"> <li>○ <b>Shared cloud systems for all parties</b></li> <li>○ <b>Shared BIM model</b></li> </ul> </li> <li>• Knowledge <ul style="list-style-type: none"> <li>○ <b>Sharing knowledge</b></li> <li>○ Market parties have a lot of knowledge about innovation</li> <li>○ Understanding the contract</li> </ul> </li> <li>• Competences <ul style="list-style-type: none"> <li>○ Leadership, social and communication skills</li> <li>○ Commitment</li> <li>○ Dealing with conflicts and tensions</li> <li>○ Innovative attitude</li> <li>○ <b>Ambidexterity</b></li> </ul> </li> </ul>

Table 2: Summary of the results (The differences between the cases are marked bold)

## Discussion

This research focuses on determining and identifying tensions that may occur in IPS procedures and on how to deal with those tensions in an IPS procedure by comparing two real-life cases in which an IPS procedure is used. This is relevant to find how a balance between contractor and client can be ensured within an IPS procedure.

The research results indicate that IPS procedures can be interpreted broadly. The two cases that are central to this research paper have the same name but in terms of content and approaches they vary widely. This is interesting because it demonstrates the impact of the different choices that are made by the client during the start of the procedure. Furthermore, it shows that there are three main dynamics within IPS procedures that either lead to a balance or to tensions between the client and contractor. These three dynamics include project governance, IP, and a financial component. In addition to these three dynamics, the dealing mechanisms that stem from the literature were surprisingly often mentioned during the interviews.

The dealing mechanisms that appeared to be the strongest during the interviews are relationships and contractual provisions. This can be explained by the fact that these two mechanisms have the most significant influence on the IPS procedure. A general finding is that the better the relationship, the better tensions are resolved throughout the process. When the relationships are strong, the parties felt comfortable with putting themselves in vulnerable positions and communicate with each other about the tensions. The other dealing mechanisms are more or less used in order to promote the relationships and are all interrelated. Dealing mechanisms as competences, project governance and digitised tools play a significant role in strengthening the relationships. For contractual provisions it must be noted that these can not be seen as a pure dealing mechanism as these provisions are determined at the start of the IPS procedure and are conditions for the R&D phase. This makes it debatable to see contractual provisions as dealing mechanisms because they are usually not adaptable over the course of the project which is something to take into consideration (Demirel et al. 2019).

During the conduct of this research, I have found that the contractual provisions are both a cause and a dealing mechanism for the tensions. This can be derived from the fact that factors such as the duration of the project, the costs, agreements about IP and the chosen type of contract have a major influence on the presence of tensions within an IPS. For example, case A made agreements before the competitive dialogue on the costs and IP that could not be changed later in the process. This led to tensions, especially regarding the fixed budget. The root of these tensions is because the parties made the agreements regarding the budget while the innovation was on a TRL 2-3, meaning that there were in fact still too many uncertainties to be able to agree on a good price. And on top of that, the budget was determined based on historical renewal projects which are not comparable with the actual cost for the innovation and did not allow for certainty in profits, making the business cases risky. This finding is in line with the research of Lenderink et al. (2019) stating that a fixed budget leads to an unstable situation when innovating. On the contrary, case B did not use a fixed budget but instead used an open budget and came to an agreement on the price at the end of the engineering phase which provided flexibility of the contract. This resulted in a noticeable decrease in uncertainty and risks for the involved market parties. However, a possible downside of this approach lies in the fact that HDSR had to take the risks for its own account if things would not work out the way they were planned. The fact that HDSR used this approach shows great leadership quality, which is something that we can also find in the research of Loosemore & Richard (2014) and Blayse & Manley (2004). As outlined above, case A used the IP as an incentive to participate in the contract, however, this is not necessary. After all, case B shows that the fixed profit is seen as an incentive to participate for the market parties. Therefore, the compensation for the innovation should be perceived as cost-effective to create a stable situation where the willingness to invest in the innovation is not complicated by uncertainties.

Another interesting finding was that the party that carries the IP also carries the risk for the innovation. In case A, the market parties retain the IP resulting in an increased risk for innovation, because the party for whose benefit the IP is, also bears the risks for it. This increased risk makes the market parties more reluctant to invest in the innovation since they do not want to be stuck with something that does not benefit them in the long run. In addition to that, the innovation that is being made for Amsterdam is a radical innovation as it starts from TRL 1, which entails more risks due to the uncertainties. On the other hand, case B makes use of an incremental innovation that starts from TRL 6-7, thus significantly reducing the risks at hand (Killen et al. 2019; Andriopoulos & Lewis 2010). Interestingly, case A that starts from TRL 1 uses a fixed budget and an open project governance, whereas case B that starts from TRL 6-7 makes use of an open budget and a structured project governance which came with a lower level of tensions from the start compared to case A. It would therefore be expected that this would be reversed since the unknown issues in case A require more flexibility of the budget and control through project governance. In case B, the client retains the ownership of the IP, meaning that they must bear the costs for the innovation and also bear the (potential) risks. This shows that the IP also has a connection with the financial component. One also encounters this in the literature, for example Loosemore & Richard (2014) and Doree (2004) argue that the rewards for innovation should come from the clients given that if they did not require innovation, it would likely not be realized in the construction sector. However, in case A it is reasonable that the client does not want to pay for the entire cost of the innovation as this also increases the competitive advantages of the market parties by helping them to make profits in the future. A possible



solution for this is found in the research of Chan et al. (2014) that argues that in cases like this it is important to work with mutual investments as this creates support and increases the likelihood of success.

In the day-to-day running of the business, the cooperative relationships were clearly present in both cases. Partners called each other and had regular consultations, resulting in a high level of communication and transparency. In the instance of case A, a market party even called in a cooperation coach to enhance the cooperation and relationship with the client, even though this was not stipulated in the contract. In addition, the market parties and client spoke to each other more often and in an informal manner, leading to a better relationship. In the case of case B, the relationships were good to begin with due to the use of project governance, the benefits for the market parties and the selection of participants based on the cooperation assessment. The relationships are of importance because they help to increase the understanding of each others' interests and it increases trust. This allows tensions to be overcome immediately as they occur. Other dealing mechanisms serve to strengthen the relationships. Digitised tools for example increase trust and thus strengthens the relationships. Competences play an important role with that as the behaviour and attitude is important in building relationships. In addition, project governance is an important addition to support these relationships as it increases the trust, understanding and mutual ambitions between the parties that are of great importance for the success of a project by creating commitment.

In addition, project governance is not only important for dealing with tensions but also for building relationships, mutual respect and understanding which helps with resolving tensions. Case B for instance has a strong predefined organisational structure, while the structure from case A is not so strongly defined. For case A, this led to some tensions because the preparation on the side of the client was not optimal. This observation is in line with the research of Samset and Volden (2015) and Demirel et al. (2019), that amount to the fact that the client-side preparation and a predefined organisational structure are essential for the success of the project as this leads to mutual respect and ambitions improving the relationships significantly and creating support. It must be noted that the environments and sectors of the cases both influenced the process of the project governance. The environment of case A was significantly more complex due to the density of the city, the many specialists and stakeholders that were involved and the high levels of bureaucracy that were present at the municipality of Amsterdam, resulting in the process being sluggish. For case B the environment was less complex due to the lesser extent of bureaucracy at the water board and the dike sector. This resulted in better cooperation as the parties were able to reach each other more easily which facilitated the process. Thus, the project governance is of great importance for IPS procedures as it strengthens relationships. The environmental aspect should be considered when developing the governance structure.

In the case of case A, the market parties were supported by a technical manager from the client. The market parties were able to create their own interpretation on how they would incorporate this role into their team, and each market participant did so in their own way. This research shows that when the market parties saw the technical manager as a member of their own team, the relationship between the client and the market parties were strengthened. Case B used a different approach, this approach included that some roles of the client were shifted to the contractor and vice versa. This shift in roles resulted in a mutual comprehension and respect on both sides. The contractor therefore understood the political and analytical process at the client side that, according to Samset & Volden (2015), are a common cause for tension, and the client better understood the working culture of the contractor. Thus, sharing of roles between client and contractor led to commitment between the parties, which was often cited as a good dealing mechanism as it strengthened the relationships (Nam & Tatum 1997; Dubois & Gadde 2002; Alderman & Ivory 2007).

Remarkably enough, it was found that in both cases some of the managers on the client's side and on the contractors, side had previous experience on both sides of the table. This advantage gave parties the confidence to act as a leader, which is proven to be important to promote innovation (Blayse & Manley 2004; Doree 2004). The results also indicate that an innovative attitude and culture are important when entering partnerships and integrated contracts. This outcome is in line with the research of Blayse & Manley (2004) and Rutten et al. (2007) where they mention that it is important for the parties to understand why they are participating in these types of contracts. HDSR also showed ambidexterity as they transferred and made the roles between the client and the contractor interchangeable. This is in line with the research of Smith et al. (2017) and Killen et al. (2019) as this allowed them to simultaneously exploit and explore the innovations.

Another observation is that the IPS procedures make great use of digitised tools, but both cases in its own way. In case A, the market parties used BIM models to work together on a design, but these models were not shared with the other parties that were involved. In the case of case B, they used a completely different approach which entailed that the parties shared the information and knowledge with all the parties that were involved. The parties could access each others' cloud systems, providing a lot of transparency. It is therefore not surprising that digitised tools are seen as an important instrument and are worth investing in because these

tools promote transparent communication and information sharing which contributes towards strengthening the relationships (Demirel et al. 2019).

Social innovation was used in the case of case B. This is a significant difference between the two cases. This type of innovation corresponds with the definition of social innovation which we see reflected in the research of Selvakkumaran & Ahlgren (2020). Social innovation focuses on cooperation and effective supply chain management. Whereas product innovation focuses on products and process innovation focuses on construction process innovation. HDSR stated that product and process innovations are only possible if cooperation and knowledge are bundled throughout the whole project organisation. Therefore, one could conclude that social innovation is necessary to reach the goals of product and process innovation. The way HDSR made this possible shows great commitment, leadership quality and courage from the client as they made agreements that resulted in a high level of risk for the client. Because of this, it is possible to create a stable situation before the project is even started, leading to the elimination of opportunistic behaviour. Hence, social innovation could be seen as a prerequisite for product and process innovation to succeed.

Figure 4 provides an overview of the aspects that must be taken into consideration throughout the course of an IPS procedure to develop a balanced environment. First the expectations of the parties must be discussed, this will serve as the basis of the IPS procedure as the first agreements on the contractual provisions and project governance are set with the start of the competitive dialogue. These agreements are of great importance as these are related to the main dynamics within an IPS (Figure 1) which significantly influences the balance between the client and contractor. The contractual provisions are both a dealing mechanism and a cause for tensions, so it is important that these are flexible to provide changes at a later stage in the procedure when tensions may arise. When these provisions are set in stone and collide with the project goals later in the procedure this will lead to tensions. At this point in time agreements on the cost-effectiveness should be made as well, the market parties are hesitant to innovate when there is a high level of uncertainty and when this is not set up correctly this will lead to tensions. An integrated project governance is not a prerequisite for IPS procedures (intentions), however it promotes the building of relationships significantly. So, when the project governance is set up with divided roles, mutual validation and integrated teams, support is created which strengthens the relationships. Another important aspect for strengthening the relationships is selecting the right people for the job. It is essential to select partners with experience, competences, and knowledge. This in return strengthens the relationships. The right competences and knowledge are also of significant importance when building relationships. Due to the competences managers know how to behave in certain situations to deal with conflict and thus strengthen the relationships. Workshops and digitised tools promote the building of relationships as these dealing mechanisms provide transparency and lead to trust. I have found that the better the relationships, the better the parties involved were able to negotiate and come to agreements in resolving the tensions emerging out of the R&D phase. That is why the agreements should be made in a manner that strengthens the relationships and create a balanced environment.

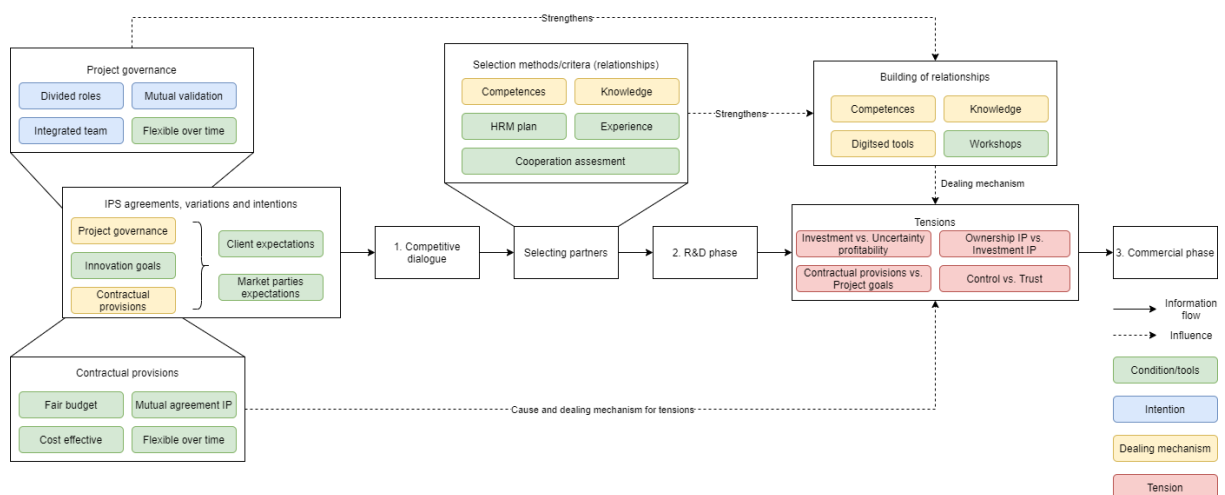


Figure 4: Role of dealing mechanisms throughout an IPS procedure

## Conclusions and recommendations

### *Conclusions*

The primary aim of this study is to identify and understand the tensions that can occur between the client and the market parties within IPS procedures to present recommendations to ensure a balance between the parties. The scientific relevance that this study serves lies in the fact that very little research has been done on IPS procedures. This circumstance leads to the fact that to this date it is relatively unclear what actions need to be taken to prevent or resolve tensions in current and future cases. To conduct this study, two real-life cases were used to gain an in-depth understanding of the dynamics of IPS procedures. Since two cases were used, comparisons could be made, thus showing the effects of the choices that were made during the project.

Through comparing the two cases and relating the findings to the theoretical framework derived from the literature, I have found three dynamics in IPS procedures that, if not implemented properly, can lead to a disruption of the balance which may result in tensions. These dynamics are the choice of organizational structure (project governance), the agreements that are made regarding the IP and the financial component. I have found that these three dynamics specifically are the main components that have an influence on the presence of tensions and balances in an IPS procedure. Figure 1 gives an overview of these dynamics and shows the choices that were made in the cases to see how these choices affected the balance and tensions within an IPS procedure.

In addition to that, mechanisms were found to (possibly) deal with these tensions during the R&D phase of the IPS procedure, these are the so-called 'dealing mechanisms'. These six mechanisms consist of: contractual provisions, human relationships, relational governance, digitised tools, professional knowledge, and actor competences. The dynamics and the dealing mechanisms are all interrelated since they have a huge influence on each other. However, it must be noted that relationships and contractual provisions influence the IPS procedure most significant. A general conclusion is that the better the relationship, the better the tensions were resolved. The other dealing mechanisms serve more or less as mechanisms for strengthening the relationships. For the contractual provisions, it is debatable whether this should be considered a mechanism for dealing with tensions during the R&D phase because they are determined at the time when the project starts and usually not at a later stage in the proceedings. However, it is recommended that the contractual provisions should be flexible so that the requirements can be adapted if there is a need to do so during the project. This allows to control the uncertainties throughout the procedure and create a balanced environment of which Figure 4 provides an overview.

The above-mentioned findings add to the current limited research base on IPS procedures and provide guidance on how to handle the different factors in order to limit tensions in the R&D phase of IPS procedures. Furthermore, it is interesting to note that some aspects that are characteristic for the IPS procedure are also found in the report published by Rijkswaterstaat together with McKinsey, that is issued to improve the atmosphere in the Dutch construction industry by encouraging parties to work together. This includes aspects such as collaboration with a long-term commitment, financially healthy and innovation and learning.

Like any study, this research also has its limitations. Firstly, there are not many references available on the dynamics within IPS. This means that there is limited literature available to compare the findings of this research to. Secondly, the two cases that are used in the case study are still in the early stages of the R&D phase, meaning that there is not much data and experience yet from the involved parties that can be shared. Thirdly, the conclusions that are drawn in this research are based on the data of merely two cases. Given this fact it could be argued that this can be seen as a limitation because the two cases together provide little data which makes it difficult to draw a reliable conclusion. In addition, the cases are very different with for example the TRLs or the context around the IPS. One could argue that the comparisons are not fair due to these differences. Lastly, the final shortcoming lies in the limited available time to conduct this study. Due to this time constraint, there was no space for more in-depth data exploration and re-interviewing of the managers that are involved in the project as the amount of knowledge about the projects and its issues increased.

Given the conclusions that have emerged from this research, there is much to be gained in the area of contractual provisions and the relationship between the client and the market parties. Future research could therefore focus on how the client and market parties should develop the contractual provisions for them to be adaptable during the duration of the project. This is an important aspect of IPS procedures as there is currently a lot of grey area on how to interpret these contractual provisions. In addition, it would be helpful to understand the dynamics at a higher level leading to an increase in project success. In my opinion it would be interesting to research who should pay for the innovation and how a fair budget for the innovation is determined.

If more consideration is given to the proper interpretation of factors such as relationships, project governance and flexible contract provisions, I see a bright future for innovation partnerships.

### Recommendations

As a result of examining the two cases, several recommendations can be made for ensuring a balance of interests between the client and contractor in an IPS procedure. First, it is of great importance that the right people are selected for the job because competences and knowledge are to be seen as important dealing mechanisms for strengthening the relationships. Competences such as an innovative attitude, leadership qualities, social skills and commitment are frequently mentioned as a tool to overcome tensions. In addition, this also applies to knowledge as this promotes support and commitment. It is therefore highly recommended to use a comprehensive HRM plan and to select the market parties who will cooperate in the project based on their way of co-operating and their experience. This is preferable as this will result in a clear understanding for all the parties and strengthens the relationships.

In addition, a predefined project governance is essential for the success of IPS procedures. Project governance vastly improves the preparation at the client's side, thus establishing an environment in which tensions are resolved without jeopardising each others' interest and increasing the efficiency of the process. In addition to this, project governance also promotes the building of human relationships through creating trust, mutual ambitions, and commitment which in return help with overcoming tensions. Digitised tools can assist in building these relationships through the sharing of knowledge, by promoting transparency and through the trust that these tools provide. It is therefore recommended to develop these tools in collaboration and to make the roles of the market parties and the client interchangeable. These adaptations result in mixed teams that consist of both members of the market parties and members of the client's side, and this will promote the support and commitment of the teams.

Thirdly, the budget should be flexible rather than being fixed. The study revealed that the budget is a main cause for tensions. Furthermore, it has been established that when the budget is fixed, this will lead to an unstable situation where tensions arise, and opportunistic behaviour is promoted which hurts the relationships. In the beginning stages of the contracts there are too many uncertainties regarding the innovation to really agree on a price. It is therefore recommended that the budget is determined on a mutual basis as this creates support and understanding for the budget that has been set. Another solution to this problem lies in setting the budget at a later stage in the project when the specifics about the budget are known, minimizing possible tensions.

Lastly, the agreements surrounding the budget and IP should be made on a mutual basis. It is found that the budget is closely interrelated with the IP component of IPS procedures. When the client intends to use the innovation for itself, they should be the one to pay for the innovation and bear the possible risks. However, when the client wants to leave the IP to the market the compensation for the innovation should be fair, meaning that it must be profitable for the market parties to participate and that the risks are shared to prevent tensions. Another aspect to take into consideration is the fact that the client should provide certainty in workflow and profits for the market parties to know whether participating will be profitable for them or not. And because of this certainty, the willingness of the market parties to invest in the innovation increases. In that regard it is recommended that the agreements regarding the budget and IP are made on a mutual basis so that one cannot go back on previously made agreements. After all, it is proven that by reaching agreements together this results in support and mutual ambitions and let that be just what is needed for IPS to be successful.

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### Appendix

PROJECT	ORGANISATION	POSITION	NUMBER OF INTERVIEWS	INTERVIEW QUESTIONS
AMSTERDAM	Municipality	Project Manager	1	<ul style="list-style-type: none"> <li>What do you think are the main reasons for your organisation to participate in this innovation partnership?</li> <li>What would you personally like to achieve within the innovation partnership?</li> <li>What do you think are the most important goals of the other parties?</li> </ul>
		Contract Manager	1	
		Technical manager	1	
	Market parties	Project and contract manager	3	
		Process Manager	1	
		Technical manager	2	

<b>STERKE LEKDIJK</b>	Waterboard	Board member	2	<ul style="list-style-type: none"> <li>• Have there been situations where you felt there were tensions between the OG and the ON because of the differences in ambitions and desires?</li> <li>• Do you feel that there are certain incentives in the contract that cause tensions between the OG and ON?</li> <li>• Have there been times when you thought: I should not have taken part in the innovation partnership, and can you give an example?</li> <li>• What do you think about the long lead time of the innovation partnership?</li> <li>• What do you think are the key success factors for maintaining the balance in the innovation partnership?</li> <li>• In your opinion, what are the three advantages and disadvantages of the innovation partnership compared to a traditional contract?</li> <li>• In what way have you ever been positively surprised by the other party in a difficult situation?</li> </ul>
		Innovation manager	1	
		To team member	1	
		Programme manager	1	
		Project Manager	1	
		Contract Manager	1	
	Strategic Advisor	1		
	Market parties	Innovation manager	1	
		To team member	2	
		Board member	3	

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