

Contract Management for Dutch wastewater industry

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CONTRACT MANAGEMENT

FOR DUTCH WASTEWATER INDUSTRY

by

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EXECUTIVE SUMMARY

This research's motivation lies on three main subjects. The first one is current infrastructure for the waste water industry is growing old in The Netherlands and further renovations and/or new infrastructure will be needed. The second is that worldwide, the use of innovative delivery methods have taken over the waste water industry. waste water treatment plants in Spain, India, US and The Netherlands are being carried out including design, build and operation/maintenance in their scope. The third is that the management of this type of contracts haven't blossomed enough due to its innovative nature; *i.e.* integrated contracts in the Dutch waste water industry are being managed with protocols adapted from other industries.

These three motivations lead the research to strive for a twofold research objective: contribute to the reduction of the knowledge gap in the contract management body of knowledge by providing a contract management –conceptual– framework; and to help the current contract management approach of the agencies in charge of the Dutch waste water industry by assessing the framework in appropriate case studies.

To achieve the objective, three research methodologies –desk research and case studies– are combined to provide the information necessary to answer the following research question:

To what extent existing contract management guidelines and contract management expertise are helpful for the current contract management approach in Design, Build, Operate and/or Maintain contracts for the waste water industry in The Netherlands?

The research approach consists of 4 steps. The first one is a desk research in contract management worldwide guidelines and the project delivery methods used in the waste water industry. The second step assess the theory found in the desk research with currently active contract managers in The Netherlands. A first sub-outcome is a theoretical guideline for contract management (draft guideline)

The third step comprises the description of the organisation in charge of executing waste water infrastructure; the Regional Water Authorities. The outcome of the description should enlighten which guidelines are more suitable for the RWA. A second sub-outcome is a dedicated guideline for integrated long term contracts owned by the RWA in the waste water industry.

The fourth step consists of an evaluation of the dedicated guideline in case studies with the appropriate characteristics. The evaluation is a semi structured interview with the contract management team involved in the different lifecycle phases of the contract. The characteristics of the case studies are long term, design-build-operate and/or maintenance project managed with a performance base contract, owned by the RWA and operating in The Netherlands.

The project delivery methods used in the dutch wastewater industry are integrated contracts comprising design, construction and exploitation (maintenance or operation). These integrated contracts are function oriented providing a long term service. A framework is created based on six worldwide guidelines for proper contract management. These guidelines are aimed at services, long term, and its performance is monitored periodically.

These guidelines are in line with the characteristics of the integrated contracts, hence useful for this research. The framework comprises three chronological phases: contract set-up, contract management and contract closure. Each phase is composed by elements, sub elements and activities; all together resulting in recommendations to successfully manage a contract.

The framework is validated by interviewing contract managers who are currently active in The Netherlands. Their professional background is very diverse, as well as their contract management experience. In the interviews most of the components of the framework were mentioned and discussed. The framework was supported by the contract managers input, thus by the practical viewpoint.

In addition, the interviewees give input to create a broad perspective of the contract management concept. Three cornerstones of contract management driven by the goal of a contract are defined: the concept, the team and the good practices. The good practices of contract management are represented by guidelines.

The research aims to help contract managers of the client side. The RWA are the entities in charge of the Dutch waste water management, hence the client. Three factors influence their decision making and operability: governance, spatial coverage and relations with other governmental agencies.

The governance structure, historical approach of executing projects, financial autonomy, and large operational manpower of the RWA reveal the desired competences when RWA are dealing with integrated contracts in the waste water industry. These competences are such as relationship management, negotiation skills and diplomatic skills. Now is clear which elements of the draft guidelines are more important for evaluating the dedicated guidelines with case studies.

The case study protocol uses the best practices available in the literature to make the design. The design comprises a semi-structured interview to assess the framework (and the guidelines) in the case studies. The dedicated guidelines provide the structured component of the design. Open ended questions to detect the reason behind the presence or absence of the guidelines ante up the informal approach. Three case studies are assessed. Two WWTP and one energy fabric, all owned by RWA. Long term contracts including design, build and exploitation phase. They all have the characteristics of performance based contracts.

The assessment is a success, guidelines from the 2nd and 3rd phase are to a large extent implemented in the contract management approach. In regard to the 3rd phase the guidelines are mostly included in the UAV-GC terms and conditions. Due to the previous reasons and the support of the interviewees' statement; the framework and the guidelines are usefulness has been supported.

Guidelines are implemented in three different ways: by including them in the contract, because they are included in the operation modality of the organisation and because the contract management team implemented them in a formal (letters) or informal (email, open communication) way.

A guideline for the management of a contract in the Dutch wastewater industry should include at least the issues of setting up a contract, document management, risk management, change management, relationship management the perks of closing a contract. The guidelines are suitable for integrated contracts whereas a service is provided besides the infrastructure, because the guidelines are functional oriented the same as the integrated contract.

When assigning clear roles and responsibilities, setting up a kick off meeting and discussing the contract thoroughly with the parties until full comprehension is achieved. Enables fully understanding of the interpretation of the contract of the contractor and helps defining the expectation and promote collaboration between the contractor and the organisation. Besides it helps the risk detection by showing clearly where are the blind spots, the responsibilities not being covered by the contractor or the organisation.

Develop and maintain a document management system while providing a single source of truth and identifying, gathering and recording relevant updated information are important to avoid change procedures delays because information for analysing the change is updated and accurate.

Finally, the twofold research objective is fulfilled by providing an unabridged framework (with guidelines) of contract management and by showing the benefits the Regional Water Authorities enjoy when applying the framework and guidelines in their contract management approach.

*Marcos Solís Madrigal
Rotterdam, December 2016*

PREFACE

The finalisation of this document not only represents my last requisite to obtain the Master of Science degree in Construction Management and Engineering at Delft University of Technology, but also the end of an experience as a student abroad, which was an objective I set in my life back in the beginning of 2013.

The first meeting I had with Marleen, Ruben and Tufail was in May of this year in the Architecture Faculty in TU Delft, where we had an informal and vibrant conversation. I considered we had great chemistry and working with them for 6 months in the topic of contract management seemed a good fit, which in the end it was.

Although the path was not always looking bright. The process of finding a company interested in support my research became a cumbersome task. All the mentioned before helped, but it was until Leon gave me a tip, and finally ended up in a meeting with Maarten from HDSR, which could not had ended up better than how it went.

In a nutshell, I would like to thank my committee, the interviewees, colleagues and specially my classmates –with whom I spent most of my time– for collaborating in the research.

Last but not least. I would like to thank *Ministry of Science, Technology and Telecommunications* (MICITT, for its acronym in Spanish) a **Costa Rican** governmental agency, who awarded me a scholarship to partially finance the studies.

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GLOSARY

- **BVP** *Best Value Procurement*
- **CM** *Contract Management*
- **CMP** *Contract Management Plan*
- **CMP** *Contract Management Plan*
- **CMT** *Contract Management Team*
- **DB** *Design and Build*
- **DBB** *Design, Bid and Build*
- **DBFO** *Design, Build, Finance and Operate*
- **DBO** *Design, Build and Operate*
- **DBO/M** *Design, Build, Operate and/or Maintain*
- **DMS** *Document Management System*
- **EIB** *European Investment Bank*
- **HDSR** *Hoogheemraadschap De Stichtse Rijnlanden*
- **KPI** *Key Performance Indicator*
- **NAP** *Normaal Amsterdam Peil*
- **NWB** *Nederlandse Waterchapsbank*
- **PBC** *Performance-base Contract*
- **PDM** *Project Delivery Method*
- **PMP** *Performance Management Plan*
- **RWA** *Regional Water Authority*
- **RWS** *Rijkswaterstaat*
- **UAV-GC** *Uniforme Administratieve Voorwaarden voor Geegreerde Contractvormen*
- **WWTP** *Wastewater Treatment Plant*

*Marcos Solís Madrigal
Rotterdam, December 2016*

1

INTRODUCTION

Every project encompasses a binding agreement, a contract. The contract set among others the rules of the game, scope of the project, stakeholders' main goal, expected results, technical specifications, blue prints, contact information, payment mechanisms, incentives and penalisation schemes.

Large construction projects are the most complex type of project of any industry (Baccarini, 1996). The same characteristics apply for large construction contracts; parties involved, goals to be achieved, specifications, and other parts of the contract grow larger and intertwine with each other. Hence a need to manage and deliver these contracts becomes a challenge.

This complexity causes innovative PDM for infrastructure –such as Build-Design (DB), Build-Operate-Transfer (BOT), Design-Build-Operate (DBO) and Design-Build-Finance-Operate (DBFO)– increase in popularity, gaining territory against traditional –such as Design-Bid-Build (DBB)– project delivery. In addition, alternative –innovative– PDM are evolving; simplifying management of contracts, and coping with the trending large and complex infrastructure project and its demands. Time and cost reduction, increased service levels and quality, and even alternative financing sources are the main goals of the new PDM trends, yet still little has been researched regarding managing of these contracts.

Not enough research has been done in developing a worldwide concept of Contract Management (CM). It is not commonly agreed which activities are overlapping between the roles of a contract and a project manager. Stakeholder management, risk management, contract monitor and contract control are the main divisions found in some CM's guidelines depicted by governmental entities in UK, US, New Zealand and Australia (McPhee, 2012; Elsey, 2007; PSC, 2002; GPCMF, 2008; OGCMF, 2014; ICNNZ, NA).

Although the guidelines are mainly for service contracts, they seem to fit innovative contract characteristics. They provide a long-term, service levels are controlled, risks are involved, stakeholders are participating actively, etc.

This research pretends to encompass contract management theory and compare it to the current approach of managing an innovative contract in the Dutch wastewater industry environment. Regional Water Authorities are responsible for wastewater management in The Netherlands. Hoogheemraadschap De Stichtse Rijnlanden (HDSR) is a Regional Water Authority (RWA) located in Utrecht, enabling the pursuit of this research objectives.

1.1. CONTEXT & PROBLEM DEFINITION

The problem is considered to be formed out of two main causes: modest existing contract management theory and increasing demand of innovative contract in the waste water industry.

The first one relies on the fact that there are differences in the conceptualisation of contract management.

Some authors (Elsey, 2007; McPhee, 2012) include the activities before and after the contract is signed while others (GPCMF, 2008; PSC, 2002; OGCMF, 2014) only take into account the post-award phase. Within these phases, guidelines –aimed at services– are developed for the organisation –client– in order to improve the contract management approach.

The second one is based on the fact that current infrastructure for wastewater treatment plants (WWTP) are growing old in The Netherlands. According to Watersector (2016) there are 352 wastewater treatment plants being operated by the RWAs (English for waterschappen). More than 27% (98) +30 years old, we could expect a large number of renovation –or even creation of new– of WWTP soon.

New technologies are on the rise, providing different options for the governmental and private entities to treat and discharge wastewater more efficiently into the environment. Table 1.1 shows some of the newest WWTP in The Netherlands using different PDM, contractors carrying out the works, the year the operation begins, the cost of the project and their capacity in pollution equivalent values.

Table 1.1: *Some of the newest WWTP –to be– operating in The Netherlands.*

N°	Water Authority & Location	PDM	Contractor	Start	€x10 ⁶	Pollut.-equi.
1	De Stichtse Rijnlanden – Utrecht	DBM	Heijmans & GMB	2019	120	140 x10 ³
2	Delfland – Harnaschpolder	DBFO	Delfluent	2006	363	1300 x10 ³
3	Noorderzijlvest – Garmerwolde	DBM	GMB & Imtech Infra	2013	20	40 x10 ³
4	Rijn en IJssel – Dinxperlo	DB	Royal Haskoning	2013	8	11 x10 ³
5	Vallei en Veluwe – Epe	DB	Royal Haskoning	2011	15	54 x10 ³

Sources: [1]:(Sector, 2016), [2]:(Delfluent, 2016), [3]:(GMB, 2016; Sector, 2013), [4]:(RoyalHaskoningDHV, 2011; Waterworld, 2011), [5]:(RoyalHaskoningDHV, 2012; Technology, 2010)

These WWTP's are managed with innovative contracts, similar to the cases presented by Capintero and Petersen (2015) in Spain, Molenaar *et al.* (2004) and Shane *et al.* (2012) in USA. This trend of using these innovative contract in the wastewater treatment industry shall be researched.

Moreover, contract management professionals (Rombouts, 2016) in the Dutch wastewater industry claim there is no single source of information available that can function as a guide for managing their contract, and that they often have to use guidelines from other entities (*i.e.* Rijkswaterstaat –RWS–, European Investment Bank –EIB–) and adapt them to their projects.

Hence, these queries arises: Are there international guidelines for contract management? Are the current international guidelines in line with the current approach of contract management? Is it feasible to use current guidelines –mainly targeted for services– in performance based infrastructure projects? Can the guidelines provide useful information to long-term DBO/M contracts?

These queries are covered in the core of this research by the means of the research objective and the research questions which follows.

1.2. RESEARCH OBJECTIVE

The main objective of the research is to contribute to the enrichment of contract management's theory and body of knowledge, by providing a global and comprehensive contract management concept. The concept comprises: a thorough description of activities materialising during the management of a contract, portraying governance structure elements, description of life cycle phases, scope definition, overlap with other professional fields and main goal of contract management.

The contribution to the theory will strengthen the reputation of contract management while leading to better practices: achieving value for money, simplifying processes and a general increment in efficiency and efficacy when performing contract management. Since the literature regarding CM is limited, is more probable to provide a broad rather specific contribution to the existing theory.

An additional research objective is to help –and if possible, even enhance– the RWA's contract management approach during the execution phase –post contract award–, by focusing in contract management's guide-

lines for long-term wastewater industry projects, specifically contract types including design, build and maintenance/operation phases.

1.3. RESEARCH QUESTION

A research question is developed to provide sufficient knowledge to fulfil the research's objective; and can be read as follows:

To what extent existing contract management guidelines and contract management expertise are helpful for the current contract management approach in Design, Build, Operate and/or Maintain contracts for the wastewater industry in The Netherlands?

1.4. RESEARCH SUB-QUESTIONS

After gathering the knowledge to answer the sub-questions of this research, the author should be capable of providing a satisfactory answer for the main research question. This research has the following sub-questions:

1. What are the relevant elements of international contract management guidelines currently found in the literature?
 - The characteristics of the newest project delivery methods used in the wastewater industry are described.
 - The answer provides an overview of the elements of a contract management structure aimed at services, comprising: scope, activities, roles, responsibilities, lifecycle phases.
 - The answer drafts a contract management framework with guidelines –a draft guideline–.
 2. To what extent current contract management practical approach supports the elements of international guidelines?
 - This will compare the current practical approach of contract managers in The Netherlands in regards to the draft guideline elaborated in sub-question 1.
 3. To what extent the characteristics of the entities in charge of engaging wastewater treatment infrastructure in The Netherlands impact the draft guideline from sub-question 1?
 - A description of the organisation and governance structure of Dutch entities in charge of wastewater treatment plants; RWAs, thus helping to understand the reasoning behind their contract management approach.
 - The expected conclusions drawn the impact of the organisation in the draft guideline.
- A dedicated guideline for DBO/M contracts in the wastewater industry is developed after answering the first 3 sub-questions.
4. To what extent the dedicated guideline helps RWA's current contract management approach in the wastewater branch?
 - The answer of this question defines a starting point in the contract management approach for wastewater industry in The Netherlands.
 - The outcome comprises the different phases of CM, tasks and responsibilities of a contract manager; discover overlapping scope with other fields and staff.
 - An evaluation of the new concept of contract management –represented by the dedicated guideline for DBO/M wastewater industry contracts– is done by appraising selected case studies; current projects in the wastewater industry.

1.5. METHODOLOGY

This section depicts the methods needed to gain sufficient knowledge to answer the research questions. For a better understanding the steps are clustered in –research methodology– groups. Although this approach has a sequential nature, there are activities that can run in parallel without jeopardising the final outcome of the research.

The steps followed in the research are depicted in Figure 1.1. The figure has sequential nature, describing the steps to carry on, and the outcome after sub-sequential steps this research have been completed. The reasoning behind the scheme is to visualise the process to be followed in order to achieve the research objective.

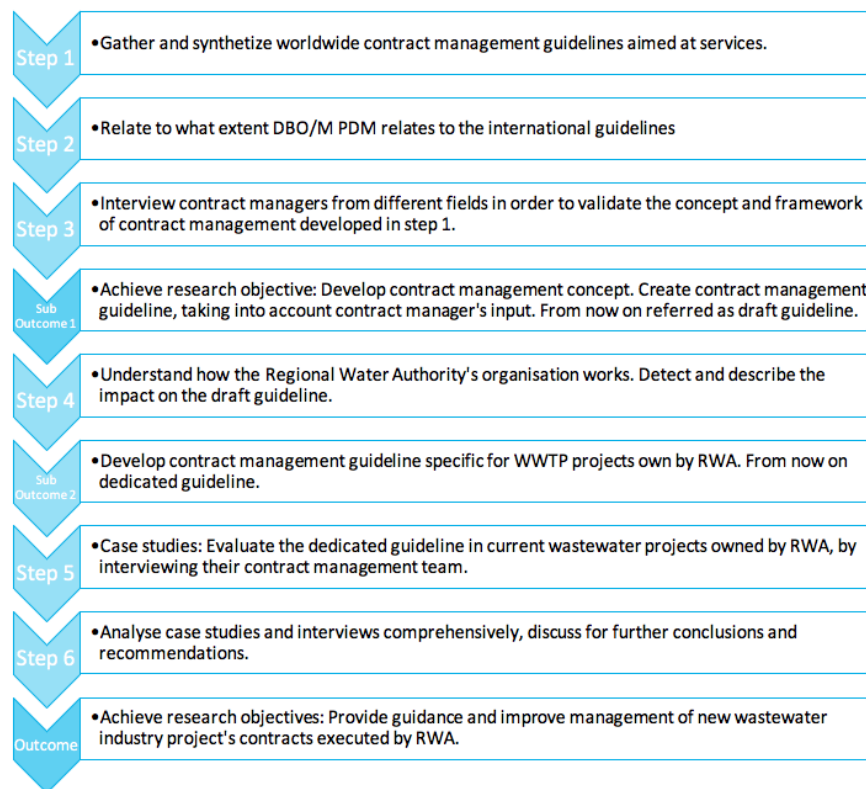


Figure 1.1: Schematisation of the steps needed to achieve the research objectives.

1.5.1. DESK RESEARCH

An in-depth literature review of the existing contract management frameworks will set the benchmark for the new guideline addressed to –wastewater industry– infrastructure projects. The steps are the following:

First, gathering literature to build CM concept with a solid theory foundation. Literature might originate among others from: renowned journals, books, magazines articles, private entities, governmental bodies.

Second, literature research to get an overview of the main characteristics of PDM including the exploitation phase. The reasoning behind choosing these type of contract is twofold: the resemblance since a service – maintenance/operation– is included in the contract, and to cope with trend of using alternative PDM for the wastewater treatment industry.

1.5.2. INTERVIEWS

Third, once the draft guideline is drawn from the concept of CM is time to add the contribution of the professional contract managers, hence the practical point of view. A set of interviews with professional contract managers pretends to enhance soundness of the guideline, by validating the theory, or even making a contri-

bution with their practical expertise.

The interviews take place in The Netherlands and their role involves contract management activities. The entities and field in which these professionals work may vary. They can represent a contractor, a consultant, or a governmental agency.

This process involves a group of 5 students (including the author of this research) also working on their graduation project in the topic of contract management. The number of interviews are the necessary to reach saturation –redundancy– in the related topics.

Sub-outcome 1: A draft guideline is elaborated from this information; the guideline is based on concepts and frameworks aimed at service contracts, and the input of the professional contract managers.

1.5.3. DESK RESEARCH –CONTINUATION–

Fourth, gathering information about RWA; understanding their organisation, governance structure, financial funds, daily operation and political interaction. After these characteristics are evaluated to see the impact in the guideline. The impact can be expressed in highlighting or diminishing the importance of aspects of the guideline.

Sub-outcome 2: After implementing the impact the step 4 have in the draft guideline, the draft guideline now becomes a dedicated guideline for the RWA managing DBO/M contracts in the wastewater industry. The dedicated guideline can now be used for further evaluation and assessment within the case studies.

1.5.4. CASE STUDY

Fifth, the goal of the case study is to validate the usefulness of the dedicated guideline. The assessment encompasses 3 cases studies, whose characteristics are wastewater projects owned by the RWA (therefore only client perspective), being manage under the premise of a DBO/M scheme. Each case study can evaluate one or more lifecycle phase of the project: design, build or operate/maintain phase.

The evaluation consists interviewing contract managers (or members of the contract management team) who are involved in specific lifecycle phases. The procedure is: an introduction of the research and the dedicated guideline are given to the interviewee beforehand, a discussion on the dedicated guideline is held in order to detect which of the elements depicted in the dedicated guideline are present and which aren't in the current contract management approach of each case study.

The main idea behind the case study is to detect to detect and explain the reason behind the absence or presence of elements, either the ones missing in the case study but present in the guidelines or vice versa. An element can be a procedure, an activity, documentation, an obligation, among others.

Part of the analysis of the case studies includes recommendations on how the missing (or non-missing) elements of the guideline can enhance/improve the current contract management approach.

Sub-outcome 3: At the end, the literature research, the interviews and the case studies provide sufficient qualitative and empirical information in breadth and depth, to achieve the research's objectives.

CHAPTERS OVERVIEW

The topics being described and discussed in this document are structured in the following way: Chapter 2 describes the guidelines and frameworks found in the literature and shapes the beginning of the framework with the draft guidelines. It also describes and gives insight in the relation between the international guidelines aimed at services and the DBO/M project delivery method characteristics. Chapter 3 deploys the practical approach of the current management of contracts (*i.e.* interviews with contract managers), as well as their contribution to the develop framework and guidelines; Chapter 4 describes thoroughly the RWA and shows the impact in the draft guidelines. Consequently, a dedicated guideline is created. Chapter 5 describes and discusses the evaluation of the dedicated guideline in the selected studies and finally; Chapter 6 depicts con-

clusions, recommendations, explain limitation and proposes topics for further research.

2

CONTRACT MANAGEMENT

This chapter consists of two topics. The first one describes the characteristics of the project delivery methods (PDM) used in the Dutch wastewater industry. The second regarding contract management and existing guidelines to manage a contract. Section 2.1 describes the characteristics of DBB, DB, DBO/M and DBFM. Section 2.2 gives an introduction in the topic of contract management. Section 2.3 explains the structure of the framework and the guidelines in detail. Section 2.4 depicts the conclusions from this chapter in order to answer the first research subquestion (See Section 1.4 in page 3).

2.1. PROJECT DELIVERY METHOD

Project delivery is defined by [Shrestha et al. \(2011\)](#) as: "A project delivery method is a process of designing and constructing any facility" and by [Rich \(2015\)](#) as: "a comprehensive process including planning, design and construction required to execute and complete a building facility or other type of project".

In the construction industry there are many delivery methods for projects; construction manager, construction management at risk, design-bid-build, design-build, design-build-operate, design-build-maintain, design-build-finance-operate ([Shrestha et al., 2011](#)), multi-prime ([Mogerman et al., 2016](#); [Rich, 2015](#)). For the purpose of this research a brief explanation of the following type of contracts is done: Design-Build (DB), Design-Bid-Build (DBB), Design-Build-Operate/Maintain (DBO/M), Design-Build-Finance-Maintain/Operate (DBFM/O).

The traditional PDM's are considered the ones where the exploitation phase is disregarded: Design-Bid-Build and Design-Build; which focus in delivering an object. The alternative PDM's are considered the ones where at least one exploitation phase is included: Design-Build-Operate, Design-Build-Maintain, Design-Build-Finance-Operate, Design-Build-Finance-Maintain; focusing in delivering a function.

2.1.1. TRADITIONAL DELIVERY METHOD

The traditional process of delivering a project by a public authority is Design-Bid-Build ([Culp, 2011](#); [Gordon, 1994](#); [Molenaar et al., 1999](#)). The method of delivering a project unifying both design and build phases to a single contractor, have been labeled as alternative or innovative ([Fitch et al., 2015](#); [Molenaar et al., 1999](#); [Shrestha et al., 2016](#); [Songer and Molenaar, 1996](#)) but also is considered by [Adams \(2003\)](#) part of the traditional methods.

[Adams \(2003\)](#); [Culp \(2011\)](#); [Fitch et al. \(2015\)](#); [Vosoughi and Vosoughi \(2015\)](#) agree that alternative PDM's include the design and build phase to a single contractor plus other phases of exploitation such as maintenance and/or operation, and even can include financing elements (DBFM, DBFO).

A schematisation of the traditional PDM and their relative duration of phases is shown in [Figure 2.1](#).

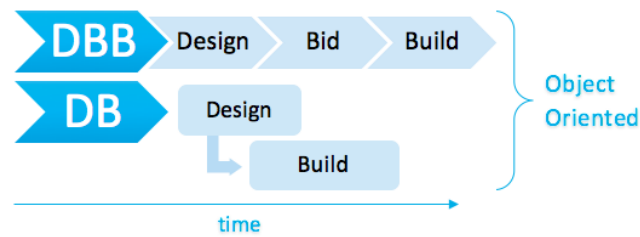


Figure 2.1: Duration and relationship of the phases of the traditional delivery methods.

DESIGN-BID-BUILD

In Design-Bid-Build, the organisation is responsible for the design, the construction and the operation of the facility in question. The organisation outsource a separate party for the design, constructions and exploitation phase.

The organisation first establishes a contractual relation with the designer to develop the detailed blueprints and specifications of the facility, and then with a contractor to build the facility. Therefore, the main characteristics of DB is drawn; the organisation has two contracts with different entities.

Once the design is awarded and completed, is used as contracting documentation of the tender. The organisation awards it to the contractor with the lowest bid. Then a contract is awarded for the construction process, while the designer assist in monitoring specifications compliance (Culp, 2011; Fitch *et al.*, 2015; Hale *et al.*, 2009; Mogerman *et al.*, 2016; Shrestha *et al.*, 2011).

Culp (2011) states that some of the downsides of BBD are: the construction process may not start until the detailed design is completed (See Figure 2.1), design level of detail is high and costly to compensate the risk of awarding the construction phase to a low qualified contractor, final cost of the project is not known until construction contract is awarded.

Culp (2011) depicts on the other hand; that is widely use method, therefore known by the majority of the members of organisations and private companies. Organisation have developed standard documents to hasten the process of contract elaboration, tender, contractor selection and award, becoming each time more familiar to the organisation and private companies, conflicts are more difficult to handle due to the lack of risk allocation between design and construction.

To provide an example, the organisation needs to treat the wastewater of the inhabitants of the city since the population increase reaching the maximum capacity of the current facility in order to meet the legal standards. Therefore, they consider the construction of a new wastewater treatment plant; first contracting a design for the WWTP, then the construction; after commissioning, the organisation is in charge of operation and maintenance of the WWTP.

DESIGN-BUILD

The design-build combines the responsibilities of the design and construction of the facility to a single contractor; providing a solution to the organisation's needs. The operation of the facility is transferred to the organisations once construction is commissioned (Culp, 2011; Fitch *et al.*, 2015; Hale *et al.*, 2009; Mogerman *et al.*, 2016; Shrestha *et al.*, 2011; Songer and Molenaar, 1996). The organisation set the specifications of the facility –demands–, request for bids, assess the offerers' qualification and awards the contractor based on the value of the offer (Culp, 2011).

Culp (2011); Hale *et al.* (2009); Shrestha *et al.* (2011) states that positives characteristics of this delivery method is that price is known before contract is awarded, construction may begin before design is completed, design-construction conflict's liability is transferred to the contractor, propitiates collaboration environment between the design and construction teams, change orders are reduced.

Downsides in the BD method are: the organisation remains with risk after the DB contract has been commissioned and in operation, there is a lack of long-term perspective for the facility, the organisation has little

control in the final design (Culp, 2011; Fitch *et al.*, 2015).

To continue with the example; the organisation in this case defines technical parameters of the equipment, treatment methodology, wastewater effluent limits. The awarded contractor designs and builds the WWTP and after commissioning, the organisation is in charge of the operation and maintenance.

2.1.2. ALTERNATIVE DELIVERY METHOD

Alternative delivery method is when operation and/or maintenance to the facility is included in the contract. The addition of exploitation of the facility to the contractor responsibilities promotes the use of performance-based contract and a service contract type for maintenance and operation. This provides the contract special characteristics that allow it to be managed as a service instead of as a facility, hence increasing range of usage of the reviewed service guidelines.

A schematisation of the alternative PDM and their relative duration of phases is shown in Figure 2.2.

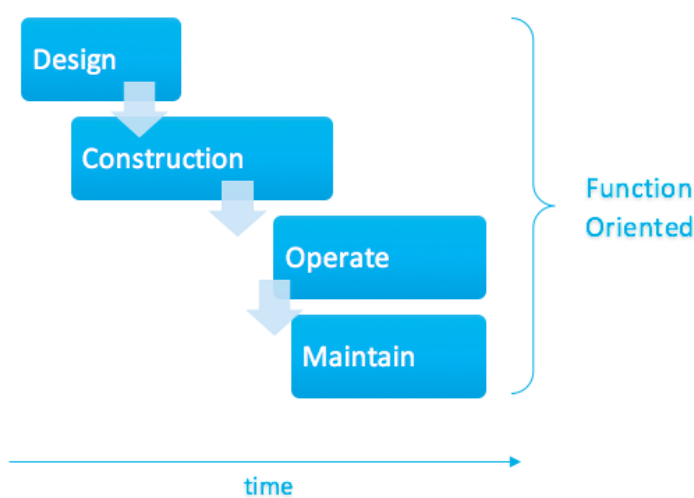


Figure 2.2: Duration and relationship of the phases of the alternative delivery methods.

DESIGN-BUILD-OPERATE/MAINTAIN

DBO/M considers the operation (or maintenance) in addition to the design-build phase (See Figure 2.2). The organisation sets performance objectives, finance the project and selects a single contractor for the design, construction and operation of the facility. A service contract for the operation and management is included, thus the contractor guarantees the operation of the facility during contract period while bearing the risk of design, construction and project operation. Although the asset is owned by the organisation, Culp (2011); Fitch *et al.* (2015) state daily operations are transferred to the contractor while Vosoughi and Vosoughi (2015) depicts contract managing and performance monitoring remain as responsibility of the organisation.

Bearing the risk of the design and construction implies bearing the risk of conflicts between designer and contractor and other subcontractors. In addition, maintenance and operating risks of the facility, governmental permits up-to-date, legal requirements, legal claims from third parties, any additional cost incurred to provide the service up to the standards. Culp (2011); Fitch *et al.* (2015) indicate in most of the cases the contractor is entitled to adjust the payment fee according to inflation factors, thus providing relatively financial stability to the contractor in the operation phase to solve the large expense incurred during design and construction phase.

Culp (2011) also states there is a single point of responsibility amongst design, construction and operation phase; easing the management of the relationships between the organisation and the contractor. Besides, stimulates cooperation between design, construction and operation phases, reducing goal misalignment and contingencies, and striving for an availability-oriented project during the contract lifespan.

Design-Build-Operate(Maintain) provides financial flexibility to the organisation for developing large engineering projects with private funds.

Following the example, the organisation in this case defines the problem as the need for the effluent to comply with the legal requirements during a predetermined period, and the contractor is in charge to comply with set of requirements while receiving a fixed amount fee per year (quarterly or monthly). The organisation has less interest on the facility being built, and more in the service being provided.

DESIGN-BUILD-FINANCE-OPERATE/MAINTAIN

This method resembles to DBO/M except that, financing runs under the contractor responsibility, therefore the financing risk is bear by the equity holders. It has taxation implications –depending of the country hosting the facility–, higher interest cost –associated with private financing–, and implies fewer offerers able to bid –specially in large and costly projects– due to large front-end investments (Culp, 2011).

As mentioned before, the delivery method remains the same other characteristics of the DBO/M, specifically the features of a performance-based type of contract.

Performance based contract Different ways of delivering project have been shown. For all the delivery methods there are also contracting strategies. The contracting strategy researched is PBC, which hypothetically can be managed with guidelines aimed at services.

Selviaridis and Wynstra (2015) define the concept of performance-based contract as the conceptualisation and interrelation of three key elements: performance, incentives and risk. See Figure 2.3 to see the graphical representation of the model.



Figure 2.3: *Performance-based contracts model.*

Source: Adapted from Selviaridis and Wynstra (2015).

Performance stands for processes and practices with the objective of specify, measure, monitor and assess outcomes and/or outputs with applicable indicators of performance. All elements present in the framework and guidelines developed in Section 2.3.

Incentives are financial -or non-financial- structure to encourage supplier behaviour. These structures aid in enhancing supplier performance, and/or punishing underperformance. Risks allocation is agreed between the organisation and the contractor; the risks should be bear by the most capable party. Payment or reward of the service is based on the compliance with performance indicators and the associated risks.

Consequently, the performance-based contract defines the level of acceptable performance for outcomes and/or outputs, with the appropriate incentives associated with performance level and a reward for carrying

the risks.

2.2. CONTRACT MANAGEMENT

The literature regarding contract management is reviewed. The literature is scrutinised in order to develop a theoretical framework with guidelines included. The guidelines are reorganised within the framework developed and each one of them includes a brief explanation.

Chao-Duivis *et al.* (2008) state a simple definition of what is a contract: an agreement. The definition of an agreement is defined as "a multilateral juridical act whereby one or more parties enter into an obligation towards one or more parties" by The Dutch Civil Code.

Some research outcome are guidelines for efficient and successful contract management. Elsey (2007) uses the definition "*the process of systematically and efficiently managing contract creation, execution and analysis and termination for maximising operational and financial performance and minimising risk*" for contract life cycle management. He provides a set of activities to be followed in the two main phases of the contract lifecycle: before and after the contract is awarded. Therefore, the viewpoint considers the tendering as well as the execution important for successful contract management.

McPhee (2012) from the Australian National Audit Office indicates the goal of contract management is to ensure all obligations by all parties are met. Including additional tasks such as: managing relationships, quality control, fulfilled within the specified time frame and achieve value for money.

Carter *et al.* (2012) define a traditional and innovative concept of CM in his book. The traditional being "*the process that ensures both parties to a contract fully understand their respective obligations and that these are fulfilled as efficiently and effectively as possible to provide the best value for money*" and the innovative "*a process by which a contract is motivated, enabled and empowered to achieve extra value added, over and above that which has been specified originally and assessable against criteria in the original contract?*".

OGCMF (2014) indicates the main objective of CM is "*to ensure commitments and obligations from buyers and suppliers are effectively met by delivering value for money outcomes and managing inherent risk*".

Relevance to the research So far the author found some inconsistencies in the contract management –aimed at services– concept definition. Some authors (Elsey, 2007; GPCMF, 2008) indicate CM includes contract elaboration, contractor evaluation, contract execution, and contract operation, others (OGCMF, 2014) say CM starts only after contract is awarded. McPhee (2012) indicates it's only about fulfilling the obligations; PSC (2002) include adding value for money, increase efficiency, manage risk, among others. Therefore, there is discrepancy on what is the scope of contract management, found in literature.

The contribution of the research in this sense is to provide a general and comprehensive contract management concept for –long-term– infrastructure projects by scrutinising the different literature and discerning which contract elements from literature applies to –long-term– infrastructure projects.

2.3. CONTRACT MANAGEMENT FRAMEWORK: A DRAFT GUIDELINE

Worldwide guidelines and frameworks were researched in order to develop the concept of contract management. The sources researched have similar characteristics in regards the type of contract: long term (Elsey, 2007; GPCMF, 2008; OGCMF, 2014; McPhee, 2012; PSC, 2002), service oriented (instead of a one-time product), client oriented (mostly Governmental entities); focus on post-award phase only (contract management only during construction, operation and/or maintenance phase) (Elsey, 2007; GPCMF, 2008; OGCMF, 2014; McPhee, 2012; PSC, 2002; ICNNZ, NA). The sources are considered suitable by the author to create a draft guideline for contracts intended for service –instead of object– oriented projects; performance base contracts.

The characteristics of the sources reviewed are described in Table 2.1. The name of the document, entity, targeted lifecycle phase, industry, and the different levels of insights; the structure of the presented framework. This will provide the reader an overview of the sources scanned to develop the draft guideline.

Table 2.1: Descriptions of the sources researched.

Source & Origin	Phase-Target	1 st Level	2 nd Level
One Government Contract Management Framework. <i>Queensland Government, Australia (OGCMF, 2014)</i>	Post-award. <i>Goods and services.</i>	Three main phases with 13 key steps are depicted: 1 Contract set-up: contract hand over, classification of contract based on risk and value, roles, contract management plan, information management structure, kick-off meeting. 2 Contract management: performance, administration, complaints, extension / renewal / variation. 3 Contract close-out: final performance review, lessons learned, closure.	A detailed explanation of the tasks to be performed on each key step, responsible person inclusive.
Good Practice Contract Management Framework. <i>Australian National Audit Office & Office of Government Commerce (GPCMF, 2008)</i>	Post-award. <i>Services over 5 years.</i>	Four blocks with 11 areas for all blocks. 1 Structure and resources: planning and governance, people, administration. 2 Delivery: relationships, performance, payment, risk. 3 Development: contract development, supplier development. 4 Strategy: supplier relationship management, market management.	Risk assessment in the activities of 1 st level that apply to the specific contract. Risk assessment stands for identifying, quantifying and risks and opportunities.
Contract Management Guide. <i>The Chartered Institute of purchasing and supply (Elsley, 2007)</i>	Pre-award and post-award. <i>Simple and complex construction contracts.</i>	First there is division between upstream (pre-award) and downstream (post-award) activities. Upstream activities relate to the tender phase of a contract. Downstream activities relate to the execution of the contract.	Second level explain the different activities to be undertaken in order achieved successful contract management.
Principles for Service Contracts. <i>Contract Management Guidelines. Office of Government Commerce (PSC, 2002)</i>	Post-award. <i>Long term service contracts.</i>	Three main groups of activities: Service delivery management, relationship management and contract administration. In addition, there are other areas to be developed: seeking for improvements, managing changes and the roles and responsibilities of CM.	There is an explanation of the activities for each of the main groups and the other areas.
Developing and Managing Contracts. Getting the right outcome, achieving value for money. <i>Australian National Audit Office (McPhee, 2012)</i>	Pre-award and post-award. <i>Large variety of contracts for the public sector.</i>	The guide is deployed by chapters as per procurement lifecycle. First 3 chapters explain the way contracting is in the public sector, the developing of the contract and formalising the contract. The following 3 chapters depict the managing the contract itself: first the entry arrangements, then the core of the contract and finally the closure.	On the second level of each chapter a comprehensive and detailed key matters that should be taking care during each phase.
Contract Management. A Supplier's Guide to the Procurement of ICT Goods and Services. <i>Industry Capability Network New Zealand (ICNNZ, NA)</i>	Post-award. <i>IT service contracts for the public sector.</i>	The guide is divided in sections, which the relevant are: planning, contract management plan, transition planning and contract review, and risk.	The planning section gives relevant areas: service delivery management, relationship management and contract administration.

These characteristics portrayed in Table 2.1 are in line with the research scope: which is intended for contract managers in charge of long term contracts for the public sector, specifically for realisation phase of the lifecycle of the contract; by all means after the contract is signed by the participating parties. As mentioned in the Methodology (Section 1.5), the reviewed sources explain the activities or tasks to be carried out by the contract management team (CMT) on behalf of the organisation –client– to achieve a successful contract.

2.3.1. DEVELOPING THE FRAMEWORK

The different sources have provided the author sufficient information to create a framework in order to encompass redundant ideas from each source. In addition, the author decided to view contract management from a time-wise viewpoint. The guidelines can be applied chronologically, however activities can overlap, or even be repeated during the lifetime of the contract.

It is necessary to mention that is a guideline –provides suggested path– and not a manual –gives detailed instructions–. This means that the guideline

The framework begins splitting the whole contract management process into three phases. The phases are contract set up, contract management and contract closure. For each phase there are elements present, and consequently for each element, there are sub elements. Figure 2.4 shows a schematisation of the phases of

contract management and the elements present in each phase.

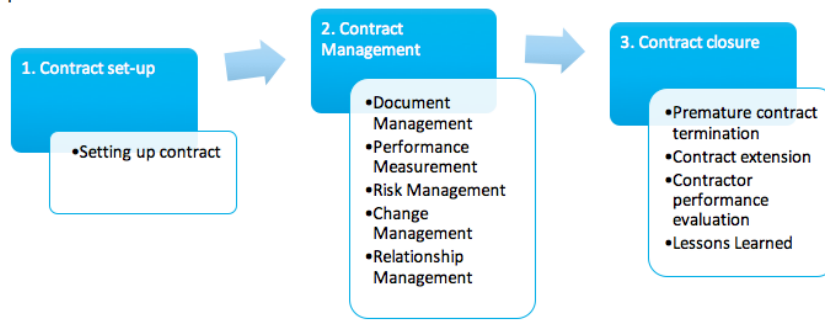


Figure 2.4: Contract Management framework: timewise phases

Each element from each phases is divided into sub elements when necessary, and those consequently contain the tangible activities or recommendations to be executed by contract managers. The core phase in which lies most of the activities is contract management. The five elements from that phase is divided in sub elements. Each sub element contains activities with similarities in their purpose. Figure 2.5 depicts the elements and sub elements of the second phase; contract management.



Figure 2.5: Areas of phase 2: Contract management

The sources reviewed have redundancy in the aspects compiling Figures 2.4 & 2.5. The terminology used for denominating the elements varies according to the source. Nevertheless the description of each phase and elements were clear and straight forward. Each source’s contribution for the conformation of the framework is portrayed in Table 2.2. It shows detail reference from each source towards the framework, or if there is no contribution at all.

The following sections give an explanation of the guideline, based in the before mentioned framework. The guideline should be follow and executed by the CMT. Please refer to the draft guideline in Appendix A for better understanding.

Table 2.2: Detailed referencing for from framework

Contract Set-up	Documents Management	Performance Measurement	Risk Management	Change Management	Relationship Management	Contract closure
(OGCMF, 2014, p. 8)	(OGCMF, 2014, p. 19)	(OGCMF, 2014, p. 15)	(OGCMF, 2014, p. 20)	(OGCMF, 2014, p. 20)	N/A	(OGCMF, 2014, p. 23)
(McPhee, 2012, p. 72)	(McPhee, 2012, p. 92, p. 103)	(McPhee, 2012, p. 95)	(McPhee, 2012, p. 84)	(McPhee, 2012, p. 99)	(McPhee, 2012, p. 85)	(McPhee, 2012, p. 101, p. 112)
(GPCMF, 2008, p. 8)	(GPCMF, 2008, p. 8, p. 12)	(GPCMF, 2008, p. 11, p. 14, p. 16)	(GPCMF, 2008, p. 13, p. 17)	(GPCMF, 2008, p. 14)	(GPCMF, 2008, p. 10, p. 16)	(GPCMF, 2008, p. 25)
(Elsley, 2007, p. 24, p. 30)	(Elsley, 2007, p. 30)	(Elsley, 2007, p. 27, p. 32)	(Elsley, 2007, p. 31)	(Elsley, 2007, p. 26)	(Elsley, 2007, p. 28)	(Elsley, 2007, p. 34)
(PSC, 2002, p. 16)	(PSC, 2002, p. 38)	(PSC, 2002, p. 18, p. 42)	(PSC, 2002, p. 24)	(PSC, 2002, p. 36, p. 46)	(PSC, 2002, p. 28)	N/A
N/A	(ICNNZ, NA, p. 8)	(ICNNZ, NA, p. 6)	(ICNNZ, NA, p. 11)	N/A	(ICNNZ, NA, p. 7)	(ICNNZ, NA, p. 10)

2.3.2. PHASE 1: CONTRACT SET-UP

Table 2.3 shows the guidelines for the Phase 1: contract set-up. The explanation of the guidelines is shown below the table.

Table 2.3: Phase 1: Contract set-up

N°	Activities
1	The contract management team is in charge of process and transmit all the information from one phase to another.
2	Receive and process the handover information from the tender phase, includes contract, specifications, risk assessment, scope of work, legal documentation, warrants, etc.
3	Develop the contract management plan with the contract management team.
4	Assign clear roles and responsibilities within the contract management team.
5	File all formal documentation in the information management system.
6	Set up a kick off meeting to discuss contract with contractor and other related parties.
7	Discuss the contract thoroughly with the parties until full comprehension is achieved: scope of work, monitoring measures, customer satisfaction, pending matters from tender phase.

The contract set-up comprises the handover of contractual official documents: contract itself, specifications, risk assessment, insurance certificates, scope of work, supplier proposal, tender documents, contract management plan, etc.

This first phase is important to make the goal of the contract clear for the contractor, the organisation and other stakeholders involved. If the information of the contract is clear, then the expectations are set, boundaries are drawn and parties involved in the contract know exactly what to do and what to expect. A clear understanding of the contract also facilitates assignment of task and responsibilities. If the guidelines of the first phase are conducted properly, the contract manager can detect contract failures, spot contract clashes and unassigned tasks with sufficient time in order to come up with a solution or at least create awareness of a particular situation.

On the other hand, if the contract manager fails to do them, the solution of issues will probably have a reactive instead of a preventive pattern. Some task might not be executed because each party believes is responsibility of another party. The description of the activities recommended to be executed are described below.

The documents are transferred from the procurement to the execution team. After the contract is assessed by the execution team, roles and responsibilities are assigned, the contract management plan (CMP) is finished, based on the CMP –if existing– from the tender phase.

The CMP includes the processes and systems, performance measures, identified risks, and others matters to be used in the contract. All formal documents comprising the contract are registered in the Document Management System (DMS). A kick-off meeting is then schedule with the CMT –even with the tender team if necessary– first and then with all relevant parties to discuss the content of the contract.

The first meeting ensures the contract is understood entirely, roles and responsibilities are assigned and agreed, contract scope is clear, and a thorough and comprehensive analysis of the contract. The second meeting with all relevant parties discusses organisation's expectations, monitoring measures, scope of work; as well to ensure absolute understanding of the contract by all. In these meetings could also have room to discuss unresolved problems from previous phases (tender phases).

2.3.3. PHASE 2: CONTRACT MANAGEMENT

The author based the second phase of contract management in a structure of 5 core elements: document management, performance measurement, risk management, changes management, relationship management.

DOCUMENT MANAGEMENT

Table 2.4 shows the guidelines for the element Document Management of Phase 2: Contract Management. The explanation of the guidelines is shown below the table.

Table 2.4: *Phase 2: Contract Management. Document Management*

N°	Activities
8	Provide updated, accurate and consistent information to the related parties regarding the contract topics
9	Develop and maintain a Document Management System (DMS) for managing information and providing a single source of truth.
10	Have an updated list of contact of the people from different parties (and the organisation) involved in the contract.
11	Inform about relevant changes in the contract to the related parties.
12	Have a digitalized and hard copy of all formal documents in the DMS.
13	Identify, gather and record relevant updated information in the DMS.
14	Elaborate performance reports based on information accrue by other members of the CMT.
15	Record underperformance events in writing with parties' acknowledgement.
16	Elaborate reports within the agreed periodicity, based on information accrue by other members of the contract management team.
17	Ensure periodic reports are complete according to contract terms and conditions but also fulfilled reflect information needed for the contract management team and other related parties.
18	Ensure periodic reports are supported with the correspondent attachments: a) Payment slips, b) Outstanding guarantees, c) Insurance in force, d) Progress schedule and cost control, e) Performance monitoring, f) Organisation's assets maintenance, g) Changes, h) Updated risk register.
19	Determine if the service provided comply with the service level agreed in the contract before processing the payment, with the help of performance reports.
20	Follow the payment procedure according to the contract terms and conditions.
21	Payment processes and mechanisms are defined and in place.
22	Incentive structures are based on desired outcomes, with appropriate approval procedures.
23	Avoid the organisation to fall into onerous commercial terms, such as price escalation or compulsory payments without added value.
24	Establish official media for communication with each party involve in the contract.
25	Refer parties to the DMS when requesting information.
26	Determine level of importance of which communication should be registered the DMS only and which should also be notify to the related parties.

This core element is important in order to have a unique and updated source of information. A unique source

prevents from parties using outdated information, and therefore making decisions based on inaccurate information. The element is also important to have appropriate records of the contract. The records help for tracing or tracking causes and consequences of issues, setting precedents, provide historical data and inform new staff about project status.

Since the contract is a legal binding agreement, it is important having documentation to support the contract progress, changes, payments, etc. The documentation provides support and proofs in case there is disagreement between the parties. The documentation are also proof when the contract is about to finish, providing the necessary documents that prove the fulfilment of the contract terms.

Having readily organised documentation also facilitates the responsibilities of the contract management. Knowing where to search for information makes his work more efficient and effective. Failing to do so, might impact: his performance when issues arise, collecting payments, illustrating progress, etc.

Document management is named differently among the literature; contract administration (Elsley, 2007; PSC, 2002; OGCMF, 2014; ICNNZ, NA), administer the contract and keep records (McPhee, 2012) and, area of administration (GPCMF, 2008).

Contract administration involves special clerical activities to maintain contract documentation organised, readily available and updated. The documentation, depending on its nature can be separated in four different groups: contract related, performance records, periodic reports, communication among stakeholders.

In a complex project –involving several processes and stakeholders with different demands and needs– there can be a large amount of request for information regarding the contract. This information after processing it, leads to important outcomes and/or function as support material for decision-making.

One way to embrace all sensitive demands is to develop a Document Management System (DMS); providing a single and updated source of information. Outdated information should not be disregarded from the DMS since it might be necessary to identify liabilities (*i.e.* in the case of a claim or dispute). The accessibility of the information must be limited to the parties of the contract and the stakeholders, not all can access the same information.

Document Management System The DMS is a digital platform where all information regarding the contract is stored: contract itself, financial statements, periodic reports, performance reports, claims, risk management plan, schedule, cost control and planning, correspondence, etc.. The DMS should provide limited access to the parties and stakeholders of the contract, depending on the organisation's governance and willingness to distribute information. The client should assess to what extent certain information can be shared with the contractor.

Activities involved in this sub element are related to maintain the contract updated, but also informing the stakeholders about the relevant changes, agreements or decision taken regarding the contract. *i.e.* change in performance indicator, scope change, team members changes, among others.

Performance records The performance records are the documents that reflect the performance level of the parties –contractor(s)– involved during the contract. The performance records are commonly performance reports, the content of the reports are defined by the CMT, the contractor and the terms & conditions of the contract. Usually the report includes: schedule, cost control, planning, progress, resources used, key performance indicator (KPI) for services or deliverables, financial status, among others.

The performance reports are useful to monitor the performance of the contractor (and the client) thus, if unsatisfactory levels are detected –on time–, mitigation measures can be carried out. These records are also usually part of the documentation needed to process the payments, especially if payments depends on achieving certain performance levels.

Periodic reports The main goal is to inform the status of the project throughout the time. The periodicity of the reports relies on the nature and intrinsic characteristics of the contract. The report contains the status

of different divisions of the contract: financial, performance, schedule and milestones progress, risk, changes and general compliance with the overall contract.

Financial includes cost control, value compliance with the contract and spending over time. Performance should include the current KPI's to be measure and the score. Schedule includes the progress and milestones achieved, and forecast of estimated finish date. The updated risk register is included in the risk division, with the appropriated mitigation actions. It is important to highlight changes that already have been implemented in the contract and their impact in cost, time and quality (KPI's help in this matter). In addition, other matters needed to comply with the contract not mentioned above.

The reports can be used as documentation supporting payments, help with forecast for project completion, releasing warranties, insurance related, public reputation, among others.

Payments Are usually the culmination of a milestone linked to the service delivered. Besides, comprises complete documentation obeying the contract terms and conditions. When a payment is made it can be assumed that all procedures were complete and the organisations is satisfied with the service acquired.

It is important for the organisation to establish well-structured incentive mechanisms in order to stimulate the continuous improvement of the contractor performance. However, the CMT shall guard the organisation from ending in situations where payment is mandatory without the correspondent value.

Communication Official media should be established by the CMT, understood and followed by the rest of the parties.

It is important to inform about major changes in the contract that might have an impact on customers, contractor and stakeholders. Communication is key to contributing to an honest, transparent and trustworthy environment between the organisation and other parties.

PERFORMANCE MEASUREMENT

Table 2.5 shows the guidelines for the element Performance Measurement of Phase 2: Contract Management. The explanation of the guidelines is shown below the table.

The contract manager should ensure the contractor is delivering the service according to the agreed levels. If the contract manager fails to do that, the organisation would not know if the agreed service levels are being attained. One way to ensure the contractor is fulfilling the agreed service levels is by measuring performance.

If the contract manager is measuring the performance, then it would known when the service levels are being achieved or not. If the measures allows it, the contract manager can predict if the service levels will be achieved if there is a change in the process of achieving the agreed service levels.

This allows the organisation and the contractor to make changes in the processes and check if the agreed service levels improve or not. Also if the service levels can be attained with less resources, or a better service is provided using same resources, or simply the ratio between resources/service levels is being reduce.

The contract manager can used the measurement of performance to increase the value for money of the contract. It is the goal of the contract manager to strive for value for money in the contract; and the tools for measuring performance allows it.

Elsey (2007); McPhee (2012); GPCMF (2008); OGCMF (2014) concur on this area as performance management, while Elsey (2007); PSC (2002); ICNNZ (NA) named them service delivery management, however all concur in the same concepts: measures for performance, monitoring performance, assessing results and even discussed underperformance actions. The author named this element performance measurement.

Performance measurement is an ongoing task that ensures the service is being delivered up to the standards. Performance measurement defines KPI's for later evaluation and continuous improvement, striving to avoid underperformance; all stated in the Performance Management Plan (PMP).

Table 2.5: Phase 2: Contract Management. Performance Measurement

N°	Activities
27	Create a Performance Management Plan including the following: Key Performance Indicators, service level agreements, frequency or periodicity of measurement, procedure for evaluation of results and contingency plan for underperformance.
28	Confirm the clearness and measurability of performance indicators with the contractor.
29	Ensure the indicators are comprehensively understood for all parties and aligned with contract objectives.
30	Define realistic scales of performance for all indicators to provide a scale for establishing incentives to the contractor when over achieving standard level of performance.
31	Establish indicators to measure customer satisfaction.
32	Consider the value of the outcome of the measuring should be larger than the cost of measuring the indicator.
33	Review periodically the monitoring outcome to detect possible underperformance.
34	Review periodically the efficacy of the measures, assess them and reconsider if necessary.
35	Ensure the value/cost ratio of the measures is increasing during the lifespan of the contract.
36	If sights of underperformance are detected, communicate with the correspondent parties to find a solution.
37	Provide feedback to the contractor regarding their performance.
38	Identify the underperformance's causes and consequences for the parties involved.
39	Assess the severity of the underperformance, if low; informal communication with contractor should be enough, if severe; discuss with contract management team and contractor to revert situation and reduce magnitude of consequences.
40	Inform stakeholders and related parties about the underperformance.
41	Part of the contingency plan is to consider the possibility of changing contractor.

The PMP includes the answers of the following queries: How the KPI's are selected based on cost and value of measuring? How the evaluation of KPI's is conducted? What is the main objective of measuring performance? How can continuous improvement be achieved? What measures should be implemented in case of underperforming?

Defining Key Performance Indicators CMT should ensure that previously defined KPI's –in the procurement phase– should have SMART properties (specific, measurable, actionable, realistic, time-based). KPI's are in function of the service to be delivered, meets service levels and allows monitoring, assessment and amendment in a clearly manner. KPI's should also circumscribe user satisfaction monitoring, capability to deliver, relationship growth, improved development and added value.

Moreover, the scales used to measure the KPI should be easy to read, understandable, and realistic attainable. The KPI's not only should be establish to measure the service levels, but also to measure the costumer satisfaction.

Monitoring, assessment and amendment of KPI's Monitoring and evaluating the KPI can be a demanding and expensive process, therefore the added value the measurement outcome has, must be counterweighted with the cost and the risk associated when applying the measure. The measures with high risk, value and cost should be assessed and resourced correspondently, thus resources should be allocated accordingly for analysing a costly and risky measure. Implementation of a measure consist of the physical measurement elements, workforce, periodic monitoring, reliability of the data, and the data analysis.

An increase of the value/cost ratio implies an enhancement in delivering the service. Consequences to the organisation due to service improvement are: increased value for money, beneficial payment mechanisms, increased customer satisfaction, innovation, more commercial opportunities for future contracts. On the other hand, consequences for other parties are: higher profit, innovation, better economy, reputation enhancement, among others.

If the organisation wishes to perceive the benefits of continuous service enhancement, the performance measures should be reviewed and assessed periodically. Measures might remain unchanged during contract lifespan, but could vary; some reasons behind this variance are: change of legislation, change in the organisational structure, changes in the contract scope.

It is important to understand that performance measures are costly, and the main objective is to increase performance, instead of controlling the contractor. The result of an evaluation might provide an opportunity to the contractor to seized incentives in exchange for performance enhancement of the service.

In addition, monitoring helps to detect events or situations prior becoming a complication, thus allowing more time for the organisation to react against a possible setback. If the complication is inevitable and value/cost ratio is decreasing or the service is not complying with the contract specifications, then the concept of underperformance arises.

Underperformance Underperformance occurs when the contractor is not complying with performance indicator levels according to the contract specifications.

Once the reason of the underperformance is identified, is important to assess the contingency plan: cost implication, schedule delays, quality of the service, impact to the organisation and stakeholders.

When the contractor falls into underperformance, it should be informed and then jointly with the organisation assess the contingency plan to reduce consequences.

According to the severity of the underperformance, mitigation measures vary, for low impact underperformance; informal communication with the contract is most of the times enough. For more severe underperformance levels, measures vary from payment withholding, involving higher level in the hierarchy, or even stop the contract temporarily. In case the underperformance continues, legal procedures should be considered.

RISK MANAGEMENT

Table 2.6 shows the guidelines for the element Risk Management of Phase 2: Contract Management. The explanation of the guidelines is shown below the table.

Table 2.6: *Phase 2: Contract Management. Risk Management*

N°	Activities
42	Use a risk register as a tool for risk management in case there non in the contract, otherwise continuously updated the risk register stated in the contract.
43	Identify risks (and opportunities), with cause and consequences, assign impact and probability values.
44	Elaborate mitigation measures and contingency actions, consult suitable professional according to the risk nature.
45	Rank risks according to their value for further assessment.
46	Contract management team is responsible for the risk bear by the organisation.
47	Assign risks within the contract management team to the best suitable professional profile.
48	Involve the organisation hierarchy levels accordingly to the value of the risk.
49	Review and update the risk register periodically.
50	Reassign risks to the party best suitable to bear them in case of change of conditions.

Risk management consist in detecting, analysing and reducing the risks that might hamper the contract goal fulfilment. If the risks are reduced to zero, then the predictability of the contract increases. Predictability in the sense of time, quality, cost, costumer satisfaction. That means the contract manager knows precisely the cost of the project, duration, quality of the service.

Reducing certain risks to zero is practically impossible, nevertheless the risks can be controlled and mitigated to a certain extent. It is the responsibility of the contract manager (or the CMT) to detect all possible risks that

might hinder the process related to the contract.

Examples of inadequate risk management are: failing to detect a risk, detecting a risk late, using an ineffective mitigation measure, failing to predict the consequences of the risk. If risk management is not done properly, then it is probable that the risks impact in the contract. Repercussions of the risks could be: delays, cost implications, quality problems, reduce customer satisfaction, etc.

A successful risk management is seen as detecting the risk on time, mitigate them with the most efficient and effective measures, and be able to control the unmanageable risks. The contract manager should use the necessary tools to execute proper risk management.

In regards to the guidelines, it is important to mention that every single source applies the same terminology for risk management. Risk is defined as an event generating an unknown outcome (positive or negative). Risk management consist in identifying and evaluating events that have an unrevealed effect during the contract lifespan.

A tool for implementing risk management is a risk register. The risk register is a list of events in which each event includes the possible cause, probable consequence, probability of occurrence, impact -time, money, quality, others-, mitigation measure, residual risk and contingency actions.

The events with positive impact in the contract are called opportunities, and with negative impact are simply called risks.

Risk Register: Identification, mitigation and evaluation The risk register consists of a list of risks that influence the contract. It includes the description of the risk, it can be related to political, technical, contractual, environmental or other matters. Associated with each risk is its cause; a clear description of what would be the main trigger of such event. The consequence to all parties –the contractor, stakeholders and the organisation– is described if the risky event occurs.

The probability of occurrence can be calculated or estimated. The probability of the event can be calculated from historical data, mathematical calculations, or estimated in case of lack of information.

The impact is estimated –based on experience– or calculated –based on quantifiable data–; the outcome can be expressed as time delays, cost, quality of the service, or even damage reputation of the company, among others.

The product of the probability and the impact is the value of the risk. When each risk has a value, then they can be ranked or categorised in order to set priorities and develop actions against the risks.

A mitigation measure is an action taken before the risk occur with the objective to reduce the impact or probability of the risk. The remaining risk after the mitigation measure takes place is called residual risk. Each measure should only reduce impact or probability, but not both. Mitigation measures have four different natures regarding the residual risk: risk reduction –residual risk lower than initial risk–, risk elimination –residual risk is zero–, risk acceptance –residual risk same as initial risk–, risk transfer –*i.e.* insurance–. When impact or probability is reduced to zero, then the risk is eliminated.

A risk can be transferred to another party for an agreed price. Insurance companies usually buys risk, but sometimes contractors are also willing to buy risks. Finally, risk acceptance is when the CMT agreed that the value of the risk bear by the organisations is acceptable.

Later, the contingency actions are described, they are meant to be carried out in case the risk occurs. Contingency actions are well-tough plans for risks, the higher the risk value the more comprehensive the plan becomes.

The positive risks –opportunities– should be seized when possible, increasing the ratio value/cost of the service.

Assigning responsibilities New or updated risks are assigned by the CMT to the party most suitable and capable to bear the risk. Hence some risks are assigned to the organisation and other risks to the rest of the parties involved in the contract.

The CMT categorise the risks in a way is easy to review among the team members, so the experience and professional profile of the responsible matches the risk, *i.e.* a technical risk is reviewed with the technical personnel. Regarding the risk assigned to the other parties, the CMT is in charge for supervising the responsible for the risks.

The degree of participation of the organisation in the risks, relies on the nature of the risk, the value of the risk, consequences, capability to respond to a risk, among others.

Ongoing risk review A risk register is included in the contract when awarded, allocating the party responsible for each risk. However, during contract lifespan –particularly in long term contracts– the contract is subject to changes (legislation, organisation structure, organisation objective, contractor core business, and even contractor objective) and, in order to deliver the service up to the standards and increase the value for money ratio constantly; it is necessary to monitor, update and evaluate the risk register periodically.

Periodic reviews of the risk register help assessing the current risks and identifying newer ones. The periodic review might prevent risk firing, or provide the tools necessary to react when a risk fires.

CHANGE MANAGEMENT

Table 2.7 shows the guidelines for the element Change Management of Phase 2: Contract Management. The explanation of the guidelines is shown below the table.

Table 2.7: *Phase 2: Contract Management. Change Management*

Nº	Activities
51	Develop Change Management Plan, with appropriate change/variation/dispute procedures in line within the organisation regulations.
52	Identify the reasons behind changes, claims of disputes.
53	For changes or claims –unresolved with informal communication–, escalate the appropriate management hierarchy
54	Strive for cooperative and trustworthy environment with contractor to ease negotiations.
55	Assess changes comprehensively, repercussions to parties and stakeholders.
56	Follow the change's procedure from the change management plan.
57	Communicate change's effects to the related stakeholders.
58	Changes are made using contractual provisions and provide value for money.
59	Negotiate claims through informal communication to avoid further legal procedures.
60	Follow hierarchy escalation in the organisation management when solving a claim according to CMP.
61	Consider further procedures to solve a claim involves mediation, arbitration and litigation.

For a contract manager the management of changes is inevitable during the lifespan of a contract. A change is considered when the contract varies from its original form. If the changes are managed properly, the impact these have in the contract is reduced. The impact can be measured in time, cost, quality, but most important the goal of the contract.

The responsibility of the contract manager is then to avoid the contract goal to be deviated by the changes happening during the contract lifespan. The causes and repercussions of the changes are assessed before making decisions. The contract manager should be prepared to inform stakeholders and shareholder about the changes in the contract.

Failing to inform, or informing incorrectly may cause discomfort in the relationship between contractor and organisation or even misunderstandings. These type of issues might escalate to an extent of hindering the progress of the contract, or even stopping completely the provision of services.

Failing to conduct a correct process of a change (inappropriate change management) may lead to a dispute. Disputes are costly, time consuming and in general consumes unnecessary resources of both the organisation and the contractor. There are situations where disputes are unavoidable, nevertheless the contract manager should strive resolve the ones avoidable.

Authors differ in baptising change management; [OGCMF \(2014\)](#) names it manage complaint/disputes, [McPhee \(2012\)](#) as manage contract variations, [GPCMF \(2008\)](#) as contract development, [Elsley \(2007\)](#) calls it changes within the contract and [PSC \(2002\)](#) change control, however they all discussed the concepts described below.

In a long-term contract where the lifespan extends up to 30 years, it is expected that a contract suffers changes. In addition, the possibility of disputes between the organisation and the contractor arise as soon as the contract is awarded. If changes are managed correctly, they become opportunities to enhance the overall outcome of the contract, instead of being perceived as setbacks.

A claim is a situation where the organisation or the contractor demands reimbursement for an additional service or object outside the contract scope. The reimbursement can be monetary, schedule's adjustment, or any agreed amendment based on the contract terms and conditions. Whenever the parties cannot reach an agreement to settle a change or a claim, then it becomes a dispute.

The causes of these changes/claims/disputes, how CMT handles these issues and finally a description on how to avoid legal claims are shown in this section.

Causes of variations The reasons behind contract changes vary depending on several factors: contractor performance, organisation objectives, local legislation, international legislation, technology innovation, contract scope changes, wrong forecast estimations, stakeholder's demands, market changes, among others.

Changes should be analysed and discussed with the appropriate level of management in both the organisation and the contractor. A written and formal document should follow, and become part of the official contract.

The idea behind detecting the causes of changes, is to avoid future claims in the contract and in future contracts as well.

Change management Change events calls for cooperation and negotiation due to its unpredictability nature. They should be understood comprehensively by the contractor and the organisation, taking into account current and future implications.

Different type of changes may arise during the contract lifetime: scope, performance metrics, payment mechanisms, infrastructure, technology innovation, service, functionality, workload, etc. Changes in the scope of the contract (which typically implies workload variants) have an implication in the financial structure of both the organisation and the contractor, in case of an increase of the scope; economies of scales are considered, on the other hand scope reduction implies a redistribution costs (mainly fixed cost).

Variations in the performance metrics and payment mechanisms are usually linked together, when applied they strive for performance enhancement and higher value/cost ratio. When a new technology can't be embedded in the current infrastructure, then it leads to changes in the infrastructure. Functionality of the service rarely varies; yet when it occurs, generally implies a change in all the before-mentioned.

Change management demands negotiation and cooperation between the parties to reach an agreement fulfilling both the organisation and the contractor desires and expectations. The following subjects should be evaluated before documenting a formal change in the contract: value/money ratio, stakeholder's perception, user satisfaction, organisation core business impact, contract scope, present-day legislation and policy.

Legal claim avoidance The claims should be resolved as simple as possible. Whenever claims are not solved by negotiation, then more formal methods such as: mediation, arbitration and litigation are used to solve the claims. Negotiations are faster, less costly and should strive to avoid legal procedures, since legal procedures

are costly and time-consuming. It is important during all phases of negotiating a claim, that honesty and transparency prevails. Negotiations can take place in different levels of management.

The escalation ladder of a claim begins with an informal communication between the people directly involved with the issue. In case an agreement cannot be reached, requesting compliance to the terms and conditions of the contract by the means of a formal communication is the step to follow.

When the formal communication doesn't solve the issue, the next recommended step is an escalation with the next level of management of the organisation and the contractor. In case the highest level of management are unable to solve the claim, due to lack of power, lack of accountability or even being out of the scope or their responsibilities, then an external party should participate in solving the claim; a mediator.

The following procedure to solve a claim is with legal action: arbitration or litigation. Arbitration, considers a third party to assess the arguments of each party with decision making capabilities that eventually determine the outcome of the dispute. The organisation and the contractor previously agree on the third party decision, without a further option of re-examine the issue in dispute. Litigation involves a legal process and should be last resource for solving a claim. A litigation process can damage the commercial relations between the contractor and the organisation.

RELATIONSHIP MANAGEMENT

Table 2.8 shows the guidelines for the element Relationship Management of Phase 2: Contract Management. The explanation of the guidelines is shown below the table.

Table 2.8: Phase 2: Contract Management. Relationship Management

N°	Activities
62	Encompass the contract management team with skills to start and positively develop long term relationships with stakeholder and parties inside and outside the contract.
63	Promote clear, open, frank and peer-to-peer communication with parties related to the contract.
64	Ensure information transmitted is effective, understandable, on time and avoiding ambiguities.
65	Strive for constant improvement of the relationships in all management levels.
66	Guide proper escalations within organisation management hierarchy.
67	Stimulate cooperative and collaborative approach instead of a duel approach in the relationship.
68	Boost team work and benefit from knowing weaknesses and strengths of the other parties.
69	Avoid resorting the contract terms and conditions every time to demand the contractor to fulfil its obligations.
70	Assign in the contract management team a suitable professional in charge of relationship management.
71	Develop attitudes that promote an honest, trustworthy long term relationship.
72	Ensure communication roles and responsibilities of the team involved in the parties.
73	Communicate clearly and straightforward the organisation's service expectative to the contractor to avoid future frustrations.

Relationship between contractor and organisation should be taken care. The benefits of a good relationship are countless, and some among others are: enhanced communication, faster problem resolution and consensus, increased value for money, better understanding of each other, work as a team instead of opposing parties, reduced probability to reach a dispute, better performance.

The interaction between the contractor and the organisation is always represented by a person or a team, thus for every combination of people the interaction different. That makes relationship management a cumbersome responsibility. Thus, a contract manager with appropriate soft skills enables the correct atmosphere to have a good interaction between the parties. If the contract manager or the CMT doesn't possess this soft skills, a demand for such particular ability, at least one must be aware of the need for these skills and if necessary outsource them.

The responsibility of the contract manager is to ensure the tools are available to create the atmosphere that propitiates a good relationship. If CMT fails to fulfil this responsibility the contract is then subject to be

hampered more likely.

Elsey (2007); McPhee (2012); GPCMF (2008); PSC (2002); ICNNZ (NA) harmonise in the concept relationship management while OGCMF (2014) considers relations important but doesn't elaborate in the topic.

The relation between the organisation and other parties of the contract ought be taken care of. The other parties can be contractor(s), supplier(s), costumer(s), the stakeholder(s) or others who are impacted by the contract by a certain extent.

The relation between the organisation and other parties can be classified as: commercial, technical, business, political, social, among others. Due to the widespread variation of the type of relation, the CMT should have a specific set of skills and competences in order to handle the relations. In addition, a long term contract implies a long term relation, which ought to be managed by the CMT during the lifespan of the contract.

Stakeholder management Once the stakeholders are clearly identified, it is the contract manager team task to maintain a healthy relation with every stakeholder by transmitting trust, promoting clear and open communication among the organisation hierarchy, striving for continuous improvement of the relation, discussing issues, guiding proper escalation for disputes, transmitting and conducting assessment of demands from related stakeholders, as well as striving for a collaborative approach (both parties striving for best value for money) instead of duel approach (each party strive to get the best out of the rest).

A fruitful stakeholder management improves the following: mutual trust, confidence and transparency regarding contract issues, communication (reduce misunderstandings) between parties, disputes/claims resolution, understanding of the other parties' business strategy, value for money, productivity, customer satisfaction, knowing strengths and weaknesses of the other parties, organisation's expectations (in-line with deliverables and service provided), etc.

On the other hand, there are factors hindering these benefits: resort the contract for every single disagreement, lack cross-cultural awareness, commercial imbalance (monopoly or lack of competition).

Long-lasting relationships The relation between the organisation and the other parties are usually initiated before the contract is awarded. It is responsibility of the CMT to continue developing these relationships.

Long term relationships are subject to events (happening in the organisation or the contractor side) which may impact the outcome of the relationship. Some of those events are changes in the following: team composition, management style, core business, dispute/claim, contract scope.

Factors contributing to a successful relationship are: roles and responsibilities are clearly assigned and understood, attitudes promoting and developing a good relation, compliance of the contract term and conditions, expectations are met and appointment of a person suitable in the CMT for managing the relations. The suitability relies in their capabilities, which are explained in the next section.

2.3.4. PHASE 3: CONTRACT CLOSURE

Table 2.9 shows the guidelines for the Phase 3: contract closure. The explanation of the guidelines is shown below the table.

GENERAL CONTRACT CLOSURE

The contract closure comprises all activities and documents needed to demonstrate all contract obligations are fulfilled. These activities/documents are usually stated in the contract, but not always. Thus, contract closure implies the end of the obligations of the parties participating in the contract.

If a contract closure is not done properly, the agreement remains dormant. A dormant contract means parties are still obligated to comply with the terms of the contract. This situation of latent liabilities comprises the organisation and the contractor. This situation can be maliciously exploited to profit from either party. It also

Table 2.9: *Phase 3: Contract closure*

N°	Activities
74	Ensure all obligations and responsibilities are fulfilled by all parties to set a clear termination of the contract.
75	Evaluate fulfillments of contract goal and main objective.
76	Confirm all payments and financial closure.
77	Assess customer satisfaction during the contract lifespan.
78	Release warrants and insurance with the suppliers accordingly.
79	Proceed with the administrative closure.
80	Assert all materials and borrow equipment have been returned to the correspondent supplier/contractor.
81	Terminate all access into the project to the contractor and other parties.
82	Ensure smooth transition between new and current contractor: a) Service is being delivered up to the standards uninterrupted, b) Customer satisfaction levels are constant.
83	If possible, allow the new and old contractor to work simultaneously and transfer of information takes place.
84	Reduce risk of falling into service unavailability.
85	Be aware of key dates to dispose enough time arrange contract extension.
86	Assess current contractor in regard to performance.
87	Evaluate the value/cost ratio between extending a contract to current contractor and a new procurement process within the market.
88	Execute and analyse the contractor performance in regards to contract terms and conditions.
89	Evaluate relationship with contractor during contract lifespan.
90	Discuss contractor performance evaluation with management level of the organisation to finalise evaluation.
91	Register evaluation accordingly in the organisation's files.
92	Record and file lessons learned as they occur during the contract lifespan.
93	Discuss lessons learned with contract management team, and with the related party involved –stakeholders, contractors, etc.

means that the CMT has to continue working in a contract not providing any value and still running costs and time.

It is responsibility of the contract manager to ensure a flawless closure to settle down all obligation from the contract. A final assessment of the contract terms should take place; goal fulfilment, performance levels, customer satisfaction, cost control, contract changes, audits, lessons learned, planning and schedule realisation, etc.

After the review has been finalised and approved by the adequate level of hierarchy, then financial and administrative closure can proceed. Warrants and insurances can be processed or terminated.

All documentation of the contract is gathered: reports, final verification report, insurances and warranties. Deliverables and services provided are check and/or transfer to the following responsible entity. Excess of materials are returned, access to the facilities are terminated, and all necessary procedures to reduce risks to zero regarding the contract.

PREMATURE CONTRACT TERMINATION

Contract is considered finished when all obligations are met (usually at the end of the contract lifecycle), however is not always the case and contract premature termination or contract extension can take place. Some of the factors of the first are: default by the contract, default by the organisation, mutual agreement. The procedure for a premature termination is similar to a regular contract closure, nevertheless a smooth transition shall be ensured; the provision of the service or deliverables shouldn't be interrupted, or the interruption minimised as much as possible.

The transition arrangement between contractors implies the following for the organisation; a new tender pro-

cess, a new contract, and hence the CMT has to start over a new process, while ensuring continuity of the service or deliverables to the users.

The transition phase may increase in time depending on how complex the contract is. The more complex, the longer the transition phase. Resources should match the risk level. Overlapping time between the old and a new contractor is recommended. If overlapping is not possible, then the maximum amount of information should be transferred from one contractor to another. The cost of the transition phase between contractors should be evaluated against the value gained by changing contractors.

CONTRACT EXTENSION

Contract extensions stand for contractor continuity beyond the lifecycle of the contract, and it is important for the CMT to be aware of key dates to exercise a contract extension with sufficient time. Contract extensions are a great incentive to the contractor to improve performance.

A contractor assessed with positive feedback is considered a candidate to extend the current contract. However, other factors that must be taken into account to make a decision: value and time comparison between tendering a new contract vs extending contract, market conditions, organisation business goal, etc.

CONTRACTOR PERFORMANCE EVALUATION

The assessment of a contractor performance should be clearly understood by other CMT, departments within the organisation. The evaluation is conducted by the CMT and reviewed by higher hierarchy levels, in order to have detail oriented evaluation with a wider overview.

Contractor overall performance, strengths, weaknesses, areas for improvement, lessons learned, stakeholders perception and consumer satisfaction are part of the output of the evaluation.

LESSONS LEARNED

The lessons learned are the main factors for continuous improvement both during and after the contract lifecycle. They refer to experiences or events that took place during the lifespan of the contract, how they impacted the outcome of the contract, how they were managed and recommendations on how to prevent them in the future.

Lessons learned should be registered as they occur to avoid losing information; thus to provide a clear guidance to the CMT facing similar issues in further contracts. At the end of the contract lessons learned should be discussed by the CMT and be included in the final contract report.

2.4. SUB-CONCLUSIONS

Project Delivery Methods The alternative delivery methods (DBO/M and DBFO/M) have the characteristics of unifying the commissioning of an object (Design and Build phase) with delivering a service (Maintain and/or Operate phase). Detailed characteristics of these PDM's are shown above:

Long term (<5 years) contract: operation and/or maintenance phase is included. The draft guideline (see Appendix A) establishes recommendations based on long term contracts; *i.e.* striving for long lasting relationships (see Relationship Management in page 23).

Integrated contracts (including exploitation phase) focus on establishing a functional outcomes/outputs instead of specific drawings and specifications of an object. Functionality can be monitored and evaluated by measuring performance, the performance of the contractor of delivering a service. The contractor's performance is rewarded by payments. When the payments vary in a positive way because the contractor is over performing, then besides the payments the contractor receives an incentive. Performance and payments are present in the draft guideline (see Appendix A) and respectively explained in page 17 & 15.

All the PDM portrayed in this chapter include the risks the contractor and organisation should carry and how

the allocation of risks changes depending on the contract. This topic is covered in the framework elaborated in this research (See page 19).

Long term, functional output/outcomes and risk distribution are the characteristics of a DBO/M-PDM, hence can be properly evaluated with the framework and guidelines elaborated in this research (see Chapter 2).

The three cornerstones of PBC: risk, incentives and payments are in the contents of the framework and guidelines from Section 2.3. Therefore also suitable to be evaluated with the framework and guidelines elaborated in this research.

The international set of guidelines aimed at services (draft guidelines) have the elements necessary to guide the contract managers in managing integrated contracts. Topics present in the integrated contracts such as: incentives, long term relationships, delivering a service, measuring performance of the contractor are included in the guideline.

Framework and guideline After reviewing guidelines from Chartered Institute of Purchase and Supply by [Elsey \(2007\)](#), Australian National Audit Office by [McPhee \(2012\)](#), National Audit Office by [GPCMF \(2008\)](#), Office of Government Commerce by [PSC \(2002\)](#), Contract Management from the Industry Capability Network by [ICNNZ \(NA\)](#) and the Procurement Transformation Division by [OGCMF \(2014\)](#), the author has devised a common field regarding the structure of contract management.

The concept of contract management developed in this research is "the necessary activities to be executed during the lifespan of the contract in order to achieve the goal of the contract". The objective of the contract manager is to obtain value for money while achieving the goal of the contract.

The guidelines are mainly for service contracts, and are directed to the contract management team of the client side. In addition, they all cover the post award phase of the contract lifecycle. The timeline of managing a contract is divided in three phases, contract set-up, contract management, and contract closure.

The contract set-up deals with practicalities and cumbersome activities of beginning a contract, assembling the CMT, gathering the information from the previous phase (procurement/tender) and grasping the contract objective and details in general.

The contract management phase includes 5 core elements to be managed: documentation, performance, risk, changes and relationships. Documentation refers to administrative clerical functions of the CMT; in order to have a single source of updated information regarding the contract. Performance includes the main topic of ensuring deliverability of a service while complying with stipulated standards and terms and conditions of the contract. Risk comprises a continuous overseeing of possible undesired events the contract is subject to which could affect the output or outcome of the contract objectives, and taking the advantage of the possible opportunities that arise in order to improve the contract outcome/output. Changes, either simple or complex are identified and processed while striving for higher value for money. Management of changes, disputes and claims are included in the change management core element. Long lasting relationships aspects between organisation, the contractor and stakeholders, are analysed in the last core element; if managed properly the outcome are myriad of positive consequences in commercial, contractual and interpersonal levels.

Finally, comes the contract closure phase, which includes all necessary activities to terminate a contract whether obligations by all parties have been fulfilled or not. Hence considers aspects in case an early termination or a contract extension is required by the organisation.

The framework (conceptual model) elaborated in this chapter comprises the conceptual definition of contract management found in literature. The conceptual model includes guidelines/recommendations to conduct a proper process of managing a contract. The guidelines cover a widespread of possible events that might occur during a contract, and the best way to deal with them. Please refer to Appendix A for the guidelines.

3

PRACTICAL CONTRACT MANAGEMENT

This chapter depicts the contribution current contract management approach has in the contract management concept found in literature. Interviews with contract managers and the outcome of Chapter 2 provides the practical and theoretical viewpoint of CM respectively. Section 3.1 explains the interview protocol design and describes the interviewees and the interview process. Section 3.2 shows the support and contribution the practical viewpoint has on the theoretical framework develop in Chapter 2. Conclusion of this chapter are found in Section 3.3 and provide the answer the second research subquestion (See Section 1.4 in page 3).

3.1. INTERVIEW PROTOCOL DESIGN

As mentioned in the Methodology (see page 4), contract managers were interviewed in regards current contract management approach. The interviews were conducted by a group of 5 research students, all currently working in their graduation project in contract management, including the author of this research.

Before starting the interview process, an interview protocol is designed in such way that the questions asked, cover general topics of contract management: goal, concept, responsibilities, roles, competences, etc. In addition, there are questions targeted to deal with specific topics within contract management: relationship, changes, performance, etc.

The interview protocol consists in 24 structured questions divided in four groups, each group has a brief explanation that all the interviewers say to the interviewees before starting each group of questions. Besides there is a section where the interviewee choose which are the most important success criteria to measure contract success.

The reasoning behind using structured questions is to ensure standardisation. Yet, each interviewer is able to add open ended questions during the interview. The interview protocol is designed by the group of interviewer and its shown in Appendix B.

3.1.1. THE INTERVIEWEES

Although the outcome of these interviews is not suitable for statistical analysis, a qualitative description of the contract manager interviewed is described below.

The current role of all the interviewee is contract management. Two interviewees are working currently with a contractor, seven in governmental agencies, and the rest (4) work as consultants. Most of the interviewees (10) has a technical educational background, more accurately: civil engineering, the other three belong to the business and administration field. The working experience ranges from 5 to 30 years of experience in contract management, nevertheless some have additional experience in other roles. The details of the interviewees are shown in Table 3.1.

Table 3.1: Description of interviewees' profile

N°	Company	Agency	Role	Education	Experience
1	Hoogheemraadschap van Delfland	Government	Contract manager	Technical Business	+8 years
2	Arcadis	Consultant	Contract Manager	Civil Engineer	+9 years
3	Akida	Consultant	Contract Manager	Civil Engineer	+30 years
4	VolkerInfra	Contractor	Contract Manager	Civil Engineer	+5 years
5	CM GPO	Government	Contract Manager	Civil Engineer	+5 years
6	Heijmans	Contractor	Tender/CM	Civil Technic	+5 years
7	RWS Den Bosch	Government	Department head of Procurement and Contracts	Administration and Policy Management	+15 years
8	EcoPaints	Government	Contract Manager	Civil Engineering	+15 years
9	Antea	Consultant	Contract manager	Systems Engineering	+10 years
10	RWA De Dommel	Government	Contract manager	Engineer	+7 years
11	BTM Partners	Government	Contract Manager	Fluid Mechanics	+5 years
12	Own business	Consultant	Contract Manager	Dredging Engineer	+16 years
13	Rijksvastgoedbedrijf	Government	Contract Manager	Architecture & Building Technology	+10 years

3.1.2. THE INTERVIEW PROCESS

When conducting the interviews, most of the time there were one interviewee and two interviewers, one to conduct the interview, and the other in charge of the technical matters: recording the interview, annotating, time management. This was done to reduce the workload, and reduce the speed of the interview.

Interviews N°8-12 were held at the same time. They were introduced all together to the subject and later interviewed. For this particular occasion two interviewees at unison were interviewed by one interviewer. Consequences of this are longer interviews and the biased aspect. The bias aspect happens when one interviewee has the opportunity to hear the answer of the other interviewee before giving their own opinion. To reduce the bias effect interviewees with different educational backgrounds and working environment were grouped: interviewees 9 & 10 and interviewees 11 & 12 were interviewed together respectively.

After conducting all the interviews, these were transcribed –into english when held in another language–, and became available for all the students. The interviews were processed with a qualitative data analyser software; *Atlas.ti*, following the best practices depicted by Friese (2012). The outcome of the analysis is shown in the following section.

3.2. CONTRIBUTION TO CONTRACT MANAGEMENT

In order to validate the contribution and/or support of the current practice to the theory of CM, the interviews are coded. The coding process comprises selecting a phrase (quote) from the transcript of the interview and labelling it (coding) with keywords. These keywords are called codes.

The analysis of the coding is the next step. The analysis deploys two packages for analysing data, the first one consists of the *support* the practical CM has on the guidelines (See Appendix A). The second phase consist of the *contribution* the practical point of view provides to CM framework develop in Chapter 2.

3.2.1. SUPPORTING THE FRAMEWORK

This package was particularly simple, since the codes used were retrieved from the framework already developed in Appendix A. That means the codes were already defined. A condensed scheme is then created (see Figure 3.1, which includes the codes used by the author in order to support the theory described in Chapter 2. The codes are coloured for illustrative matters.

The criteria for coding is subjective to the author, when the interviewee mentions an activity found in the draft guideline (Appendix A), the author codes it correspondently with the ones from the Figure 3.1. All 13 interviews transcripts were coded. The coding followed a hierarchy, at first instance lower ranked codes are used first. The hierarchy decreases in the following sequential order phases (blue), elements (green) and

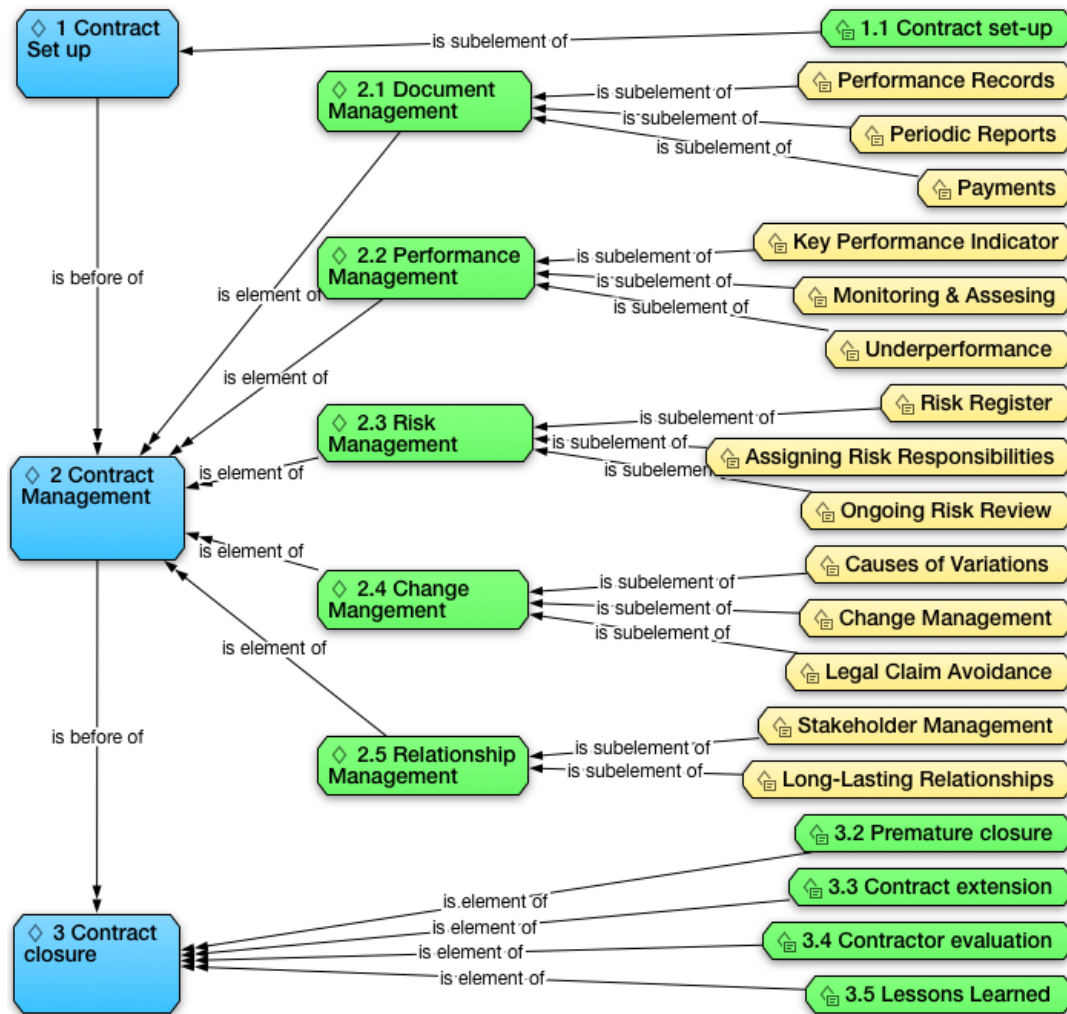


Figure 3.1: Contract Management framework –codes–.

sub-elements (yellow).

The results after analysing the quotes for each code are presented next. The procedure for analysing qualitative data comprises summarising and processing quotations from different interviewees related to a specific code. A description of the quotations for each code is made; the description includes the relationship of the quotations with the activity number from Appendix A. Naturally the description has the same structure as the framework from Chapter 2.

1 Contract set-up

1.1 Contract set-up

The common line of thinking is setting up a kick off meeting to define expectations, comprehension of the scope of works, and mainly see each interpretation of the contract. Defining goal of the contract is important, but also clarify responsibilities among the parties. Activities mentioned: 1, 2, 4, 6 & 7.

2 Contract management

2.1 Document Management

Performance Records: The product and process performance is done by the whole team. Monitoring the quality of the outcome is a common task. In addition, management by exception is recommended –reporting irregularities only– Activities: 14, 15.

Periodic Reports: Consulting and informing the other party about decisions made, confirm specifications and quality standards are met, testing, justification of payments, updated risk review, good performance; are some examples of what goes in the periodic reports. These reports help to monitor progress, quality, etc. Activities: 16, 17, 18.

Payments: Is indeed part of contract management tasks. The payments to the contractor are subject to compliance by the client. Incentives as well as penalties are included in this topic. Needless to say payments are related to risk, performance, work progress; and those topics are review before payment is made. Obtaining value for money is also related with the payment. Very popular subject among the interviewees. Activities: 19, 20, 21, 22, 23.

2.2 Performance Management

Key Performance Indicators: Define the type of measures needed to quantify performance. The measures depend on the contract deliverables and contract goal. Activities: 29, 30.

Monitoring & Assessing: Is clearly one of the main responsibilities of contract managers. Monitoring allows to detect if contract is being fulfilled or not. Monitoring includes testing performance and risk detection. Activities: 33, 36, 37.

Underperformance: If detected and not solved, a penalty should apply. It is important to clarify that underperformance rectifications are not always possible. Activities: 38, 39.

2.3 Risk Management

Risk Register: Identifying risks, and proposing mitigations measures are part of elaborating a risk register. This subelement was slightly mentioned. Activities: 43, 44, 45.

Assigning Risk Responsibilities: Assigning risk responsibilities among the contractor and the client is considered important by current practice. Good risk allocation between client and contractor leads to a good contract. However the activities specified under the theory of this subelement stresses risk allocation within team members of the organisation only and not between contractor and client. Activities: none.

Ongoing Risk Review: Responsibility distribution of new risks, monitoring risks periodically, continuous testing to reduce risk and perform recurrent risk assessments are topics mentioned under this code, which is very accurate to the theory. Activities: 49, 50.

2.4 Change Management

Causes of Variations: Every professional discuss some of the variations they have had experienced. Which is clear they remember the cause and the consequences of that variation. Activity: 52.

Change Management: Change of scope, negotiation of changes, procedure change and its repercussions, dealing with subcontractors, change approvals; are subject related to this topics. Activities: 56, 58.

Legal Claim Avoidance: Collaboration between the parties, open discussions, developing trust, escalate when necessary, good client-contractor relationship are the drivers to avoid legal claims. Activities: 59, 60.

2.5 Relationship Management

Stakeholder Management: The most mentioned subject during the interviews. Interest in develop a good relation, transparent communication, periodic meetings, developing trust and open communication, manage stakeholders, strive for smooth discussions, maintain open conversations, handling stakeholders when problems arise, negotiation with stakeholders, forcing periodic communication, escalation protocols, good attitude, proper behaviour, understand the other parties interest are topics mentioned. Activities: 62, 63, 64, 65, 66, 67, 69.

Long-Lasting Relationships: Although the relationship and stakeholder management is quite often mentioned, developing long-lasting relationship is not. However long-lasting relations have the same principles as any other relation, yet is lacking the awareness of taking care of it in a continuous way. Activities: 72, 73.

3 Contract closure

3.2 Premature closure

This topic is not mentioned at all during the interviews.

3.3 Contract extension

Only mentioned once; It is recommended to have an overlapping time when any team changes. Activities: 82

3.4 Contract evaluation

Only mentioned twice; contractor performance evaluation should be done, contractors value the feedback. Activities: 86.

3.5 Lessons learned

Only mentioned once; lessons learned can improve further designs when discussed. Activities: 93.

3.2.2. ADDING TO THE FRAMEWORK

This process of adding additional information from the interview implies a complex process. First the codes are created on-the-spot, instead of just using an existing codes. Creating codes means that a label is created for a certain topic or concept. When in the interviews is being discussed about the roles of the contract managers, then the label of that discussion (extract from the interview) is labeled as *roles of the contract manager*.

Then a relation between codes is executed. The relation between the codes was done thinking on how each of the codes created are linked or related. For example roles, competences, and awarenesses are all related to the contract manager or the contract manager team. Also the selection of a team or a specific contract manger relies on the goal of the contract. If a contract goal is to treated a certain amount of wastewater according to the standards, the contract manager should have some expertise related to wastewater treatment –instead of bridge building for example–.

After the interrelations are drawn, the codes are reviewed, and if necessary new quotes are coded, and old quotes are recoded. The iterative process will enhance the links between the codes by reviewing the relationship between the codes. The results are depicted in Figure 3.2.

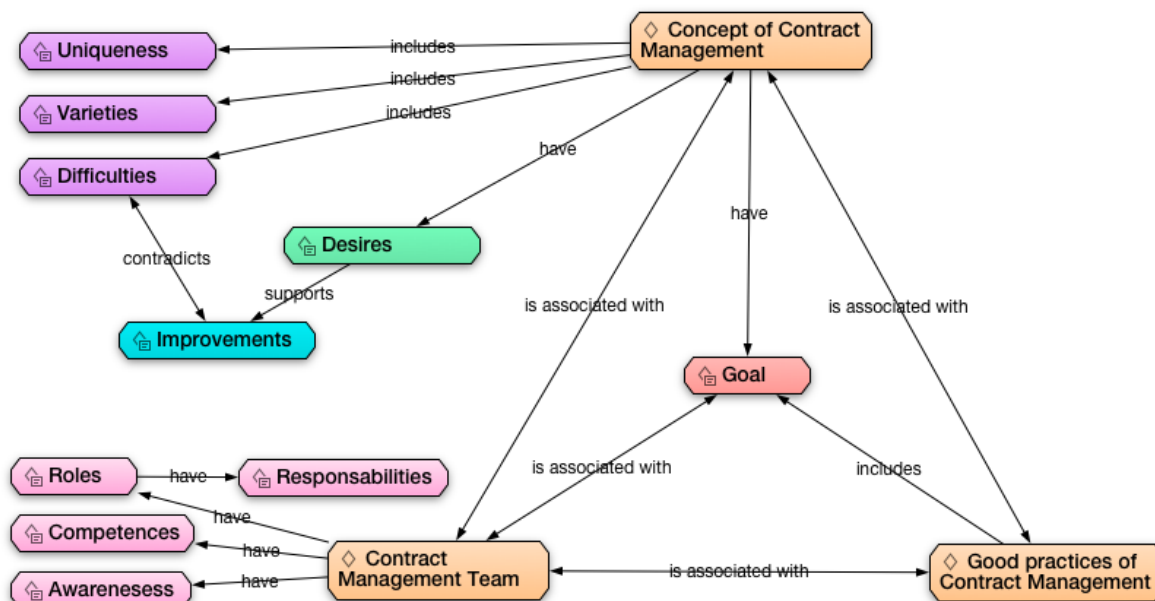


Figure 3.2: Contract Management contribution –relation between new codes–

Three cornerstones in the concept of contract management are defined: the concept of contract manage-

ment, the contract management team and the good practices of contract management. In between the cornerstones stands the goal of CM. The goal of the contract, shall be fulfilled by the CMT using good practices for managing a contract.

Each cornerstone is comprised by elements. A description of each element is described below, including the interrelations between them.

Concept of Contract Management The concept of contract management can't be defined from the interviews, however it can be stated that is surrounded by the following elements: project uniqueness, contract varieties and difficulties. The difficulties derive potential improvements shaped by the desires of the contract management team.

Uniqueness: Characteristics of the construction industry making contract management unique are: project takes places in a public space impacting society, controlled environment is not possible, there are ground uncertainties, client and stakeholders variability, subject weather changes.

The uniqueness of the construction industry would change the way contract management is done. Uniqueness means for example that different risks may arise for each contract. Therefore, a risk review must be executed periodically (as mention in guideline N° 49).

Also the uniqueness means dealing with different stakeholders for every different project. Dealing with different stakeholders means a different set of weaknesses and strengths. Because of that guideline N°68 becomes very important in order to make contract management more efficient and effective.

Varieties: Contracts varies in risk, functionality, scope, value, uncertainties, impact to the environment and people; nevertheless the processes are the same, as well as striving for the goal fulfilment of the contract.

Every contract is different. If a contract has the same goal as another one (for example treating wastewater) the contracts will be different because the have different stakeholders, risks, scope, uncertainties, etc. That is why the framework and guidelines becomes useful. A manual for example depicts the exact process to be follow in order to achieve a goal. The guidelines on the other hand, create awareness, provide guidance and gives recommendations on how to deal with a contract.

Difficulties: Plenty difficulties were mentioned, which indicates there is room for improvement in the subject, some of those difficulties are: determine when to intervene with contract basis or informal approach, work with a poorly written contract –responsibilities allocation is not clear–, reaching consensus in contract interpretation, dealing with goal changes, lack of experience in the team, lack of collaboration between client and contractor, keeping updated information of the processes, inter-webbed roles within the team, expectations are not properly set in the beginning and risk identification.

The difficulties mentioned above are being tackle with the guidelines given in this research. For example guideline from the contract set-up phase shows the tools that might tackle a poor interpretation of a contract. If a proper kick-off meeting is done –expectations are set, and responsibilities assigned– it is more likely to agree in interpretations of the contract. If no kickoff meeting is done, the organisation will have an interpretation of what they wrote in the contract, and the contractor will have another of what they read in the contract. Also there wont be inter-webbed roles within the team, because responsibilities were clearly assigned.

Improvements: Use the contract as a means not an end, focus on the soft skills of the CMT, be aware of market capabilities, dealing with scope changes, continuity of contract manager from the tender phase, improve risk allocation: the market can't bear it all, force interaction between highest management levels of hierarchy: not wait until issues arise, understand the other party interests, build trust from the beginning, select CM based on competences needed for the project: outsource when necessary.

The improvements of the contract management are also being incorporated in the guidelines. For example guideline N° 67 promotes a collaborative approach instead of a dual approach in regards to the fulfilment of the contract obligations. Thus resorting to the contract terms is not promoted, and then the contract function as means and not an end.

Guideline N°65 clearly encompasses enhancing the interaction between the highest management levels.

However there are some improvements that can have a better impact if arranged before the contract award, one example is improve risk allocation. Guidelines N°43, 49 and 50 gives aid by detecting new risks and updating the risk register. By all means selecting the party that can best bear the risk.

Desires: To have a good relationship with the counterpart, avoid or reduce delays due to change procedures, define clearly the expectations of the parties, CMT should have technical and legal skills, build trust since the beginning of the contract, keep the goal of the contract as the highest priority, strive for functionality aimed CM instead product aimed CM.

Contract Management Team

Roles: Two roles were defined according to the common behaviour: relational and contractual type. They recourse soft skills –informal– and a formal approach respectively when carrying out negotiations, process steering and dilemma solving.

Competencies: Positive thinking, open minded, negotiation skills, problem solving skills, capable of decision making under pressure, team work, goal oriented, effective communicative skills, technical knowledge, helicopter view, organised, assertive, clerical skills, detail oriented.

Awareness: Stands mainly for having an helicopter-view in order to detect issues on time and handle the varieties described above. Some of situations a CM should be aware are: expectations are described transparently, constant evaluation of risks, ensuring value for money, ensure fulfilment of obligations, understanding client's goal and contractor's capabilities, decision making without adequate information and cultural differences.

Responsibilities: The role of a contract manager includes the following tasks: monitoring contract's progress and performance, ensure goal achieving and obligations are met, planning testing, completing milestones on time, deal with contract changes, ensure requirements, responsibilities, scope and obligations are clear and understood, ensure contract interpretations are aligned and update contract documents.

Good Practices of Contract Management:

The interviewees considers there should be a guide to be follow in order to perform successfully the management of a contract. The representation of the good practices of contract management is linked with the draft guideline developed (See Appendix A.), Figure 3.3.

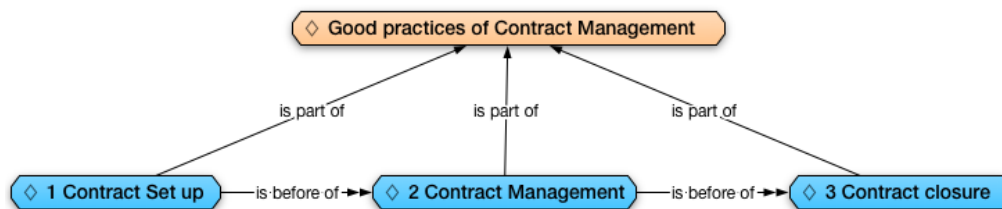


Figure 3.3: Link between good practices of contract management and draft guidelines

3.3. SUB-CONCLUSIONS

Interviewing contract managers provided the information needed to support the developed framework from Chapter 2 by referring and describing a large quantity of the elements and sub elements comprised in the framework (see Figure 2.4). The referral takes place when the interviewee mention and explains the activities included in the draft guideline (see Appendix A).

The topics most mentioned by the interviewees –CM practical viewpoint– were the payments handling, change management, relationship management, monitoring and underperformance. The least mentioned topics refer to the contract closure, although is clear for them that closing phases involves higher loads of clerical and administrative works.

Besides soundly supporting the findings from Chapter 2, the qualitative data analysis of the interviews provided the knowledge to conclude that CM has three cornerstones driven by one goal. The cornerstones are

the CMT, CM concept and good practices of CM. The team has desired competencies, defined roles and responsibilities and should be aware of certain aspects. The concept comprises the uniqueness, varieties and difficulties of CM. The later creates room for improvement CM with the help of the current desires of contract managers. Finally, the good practices are a list of recommended activities to be executed by a contract manager in order to manage a contract successfully. Each contract differs in the goal, and therefore the cornerstones are driven by the goal.

The contribution of current practice to the draft guidelines comprises a set of responsibilities, competences and awareness the contract manager should emphasise during the contract lifespan. These are not all the responsibilities, competences and awarenesses the contract manager should have; however are the ones that can better tackle what is depicted in Section 3.2.2 in regards the concept of CM. Hence, it is not only to encompass uniqueness, varieties, difficulties, improvements and desires of contract management but also to do it in the appropriate time.

This contribution is divided for each different phase of the contract. Table 3.2 shows the contribution the interviews have in the draft guidelines (See Section D.2 of Appendix D in blue colour).

Table 3.2: *Contribution of practical viewpoint of contract managers to the draft guideline –per phase–*

Phase		Description
1	Competences	Open minded, organised, assertive
	Responsibilities	Ensure parties understand their scope. Strive for functionality more than product specification
	Awareness	Real expectations of the contract are described, transparency.
2	Competences	Technical knowledge, goal oriented and effective communicative skills.
	Responsibilities	Monitor, ensure goal achieving.
	Awareness	Constantly overview and evaluate risks, ensure value for money.
3	Competences	Clerical, detail oriented.
	Responsibilities	Highly administrative, ensure goal achieving.
	Awareness	Ensure obligations are fulfilled.

First phase The competences the contract manager should have in the first phase of managing a contract are open minded, organised and assertive. If open minded helps in reaching consensus in the contract interpretation and understanding the other parties interest; activities that have a higher value in the beginning of the contract. Being organised counteracts lack of a experience in the team because having all the information updated and readily available at least provide a complete scenario for decision making It is important during the beginning of the contract because there is usually a larger amount of information that needs to be processed during the beginning of the contract. Assertiveness is a uncanny ability that helps the contract manager to communicate better, thus improving the relationship between contractor and organisation. Good communication and relationship are factors that enables collaboration faster when set in the beginning of the contract.

The main responsibility would be to ensure parties understand their contract scope. This simple statement implies fully understanding of responsibilities (clear responsibilities allocation) ergo a clear definition of what can be expected from each party during the contract. The CMT should strive for functionality more than product specification. This means for example specification for an office building, like type of concrete or amount of steel is not important, but to have certain amount of office spaces. This example must not be misunderstood saying that type of concrete is not important, but that is just a means to an end.

Second phase During the execution of the contract is it important to have technical skills related to the goal of the contract. If the contract is for having office spaces, then the contract manager should know about buildings and real state. This will help the contract manager to understand better scope changes, thus managed them in a way the goal of the contract is not jeopardise. The goal of the contract should always be present during the execution of the contract, specially since during the execution of the contract there might

be many changes. Having a goal oriented mindset helps to make the previous statement prevails. Finally having effective communicative skills is important to ensure information between contractor and organisation is being transferred. The emphasis is in this phase due to the large amount of information that occurs during the contract that is not written in the contract, this is important specially if there is a poorly written contract.

Is important for the contract manager to monitor closely the contract during execution of the contract. Monitoring in a detailed way all aspects of the contract gives the contract manager the necessary information to detect on time possible under-performances. It also helps overviewing and detecting risks on time. When detecting and assessing risks on time, it leads to have a contract where value for money is being obtained.

Third phase Closing a contract implies conducting time consuming activities when the value of the contract is already attained. However, clerical and detailed oriented competences help the contract manager avoiding falling into liability risks. There are many administrative tasks that need to be completed to demonstrate the obligations of the contract have been fulfilled. In addition, it is important to prove the fulfilment of the obligations are sufficient to achieve the proposed goal. Liabilities are terminated when obligations are met, however it doesn't always imply the goal of the contract is attained.

4

REGIONAL WATER AUTHORITIES

This chapter describes the organisation in charge of the wastewater industry in The Netherlands. The description includes their governance structure (in Section 4.1), main particularities that arise when working with or for a RWA project (in Section 4.2). For the history, responsibilities and financial system of the Regional Water Authorities refer to Appendix C in Sections C.1, C.2 and C.3 respectively. Finally conclusions from this chapter provide the knowledge to answer the third research subquestion (See Section 1.4 in page 3) is depicted in Section 4.3.

The main reason behind governmental entities to be in charge of water management in The Netherlands is of course the fact that a high percentage of land and population lives below N.A.P. (Normal Amsterdam Level), and river flows increase when approaching to the sea, thus being flood safety a major social interest. A country prone to flooding and highly populated might have awful consequences when facing extreme weather conditions.

The growing demand for regulations for the discharge of wastewater into surface water and the constant need of clean water for agriculture, recreation and industry are the basic foundations behind the conception of the Regional Water Authorities (Waterschaapen, in Dutch) in The Netherlands.

Regional Water Authorities (RWA) are decentralised and autonomous public entities in charge of flood protection, regional water management and urban wastewater treatment for the population of The Netherlands.

There are 23 Regional Water Authorities in The Netherlands in 2016 and its model is somehow unique in regards to another governmental bureau. The geographical distribution of the comprising entities, the autonomous taxation system, knowledge and expertise, financial integration and its democratic and political governance are characteristics of its uniqueness.

With the constant climate change, it is already a challenge (and even given for granted) to have dry feet and clean water in a region mostly below N.A.P. If any given day the RWA fail to do their job, most part of the population would be in an unpleasant situation.

4.1. GOVERNANCE STRUCTURE

4.1.1. COMPRISING BODIES

There are 23 RWA in The Netherlands, spread all over the country and each one of them in charge of a specific region. The geographical distribution of the RWA is portrayed in Figure 4.1.

WATERBEHEER 23 Waterschappen

2016

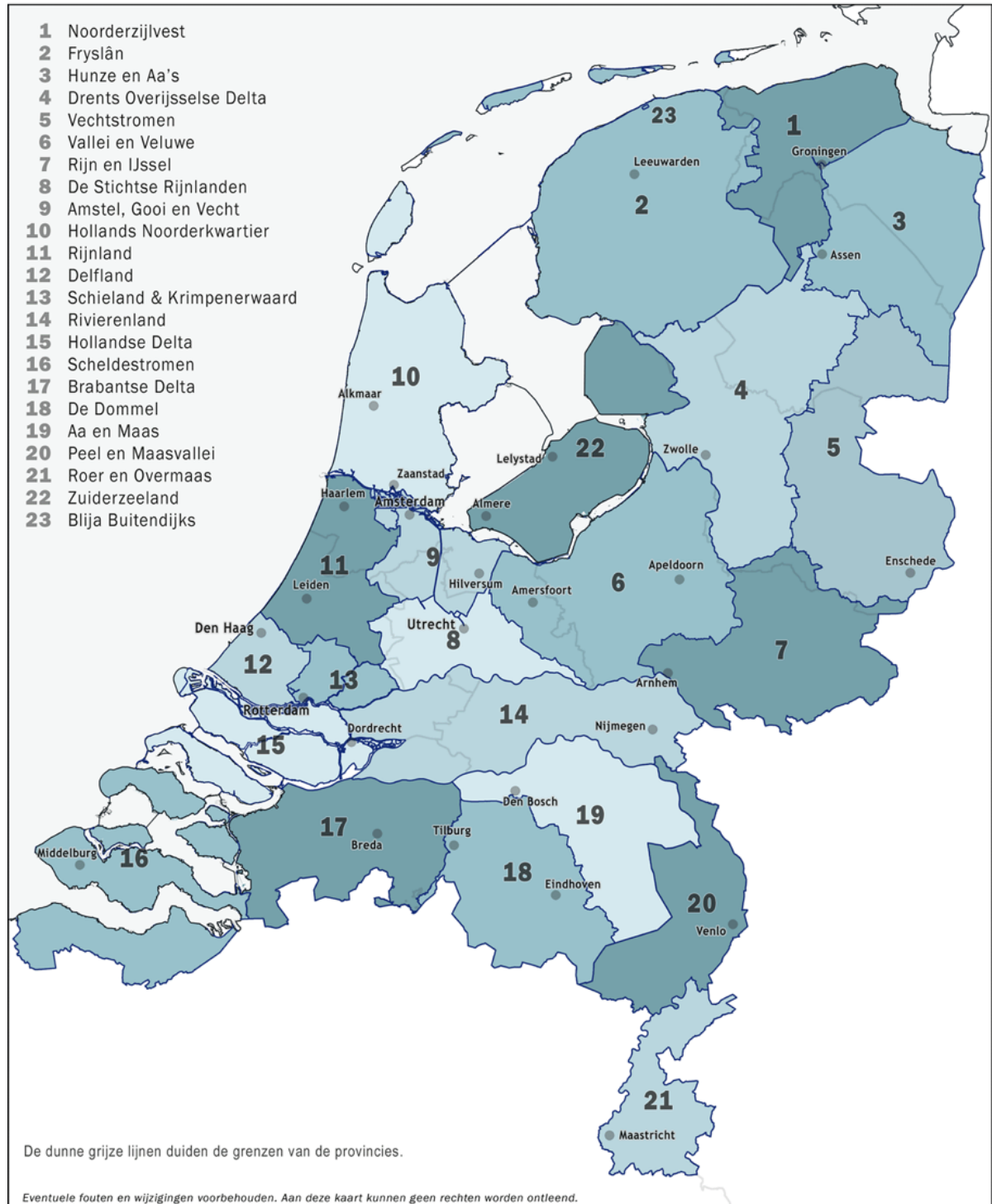


Figure 4.1: Spatial distribution of the Regional Water Authorities in The Netherlands.

Source: *van Aalst (2016)*

4.1.2. DEMOCRACY

The democracy of the RWA relies on the Dutch polder model, where decision-making is based on agreement, consultation and commitment. Currently RWA although being a governmental body, have an independent

status and their matters are not subject to other political interests. Decisions within RWA are made by the boards, constituted by a governing board, an executive committee and the chairperson (Havekes *et al.*, 2015).

The governing board follows the principle say-pay-interest, and has representatives from different stakeholder groups taking into account nature and size of their interest: residents, owners of open land, owners of nature areas and businesses. The total representatives in a governing board varies from a minimum of 18 to maximum of 30 members. The governing board representatives are elected every four years (Havekes *et al.*, 2015).

The responsibilities of the governing board are budgeting, annual accounts, water-level decisions, levying taxes, among others. The executive committee comprises a chairperson and other members elected by and within the governing board members. This committee is in charge of executing routine activities, and mainly policy making and its fulfilment (Havekes *et al.*, 2015).

Finally, the chairperson is a member of the executive committee but not the governing board, appointed by the Crown for a period of 6 years, and has no voting rights. The responsibilities of the chairperson are presiding the governing board and executive committee meetings, represent the RWA by law, and even in case of emergency has the authority to take necessary action on behalf of the executive committee and the governing board (Havekes *et al.*, 2015).

4.1.3. LEGAL JURISDICTION

Regional Water Authorities are reign by the RWA Act and Water Act. The first defines the administrative and financial structure, delineating procedures and stipulating how their responsibilities are executed. In addition, the RWA Act states the RWA are public bodies, enable to draw bye-laws with obligatory or forbidden requirements, grant or deny permits, levy taxes and even imposing punishments. It also indicates the regional portion for each RWA determine by water management factors, and their tasks are solely related to water management (Havekes *et al.*, 2015).

The latter comprises all previous legislation related to water management, that used to be scattered due to the fact that they were created to solve allocated problems. After realising these laws were spread, they were unified in the Water Act; with purpose of integrating processes, similar laws, merge documentation (permits), intergovernmental collaboration, European Standards, but mainly facilitate integrated water management (Havekes *et al.*, 2015).

4.1.4. ASSOCIATION: UNIE VAN WATERSCHAPPEN

In addition to the RWA, there is an umbrella association named Dutch Water Authorities (Unie van Waterschappen, in dutch) that promotes the interest of water management nationally and internationally. The 23 RWA are members of this association. In regards to national environment, the Dutch Water Authorities represents their member's interest to the government and parliament. Internationally, European policy impacts the RWA operation, thus the Dutch Water Authorities represent their interest against Bureau Brussel (Water Authority representative in the European Commission) (Havekes *et al.*, 2015).

The knowledge the entity has, can be categorised in three different areas: regional water governance, wastewater treatment and recycling and integrated water resources management. The first comprises information management, policy development and planning, regulations and permits, organisation and public administration, finance and taxation, stakeholder participation, cooperative governance, transparency. The second area involves activities like: chain approach, public-private collaboration, efficient operations, energy and nutrient recovery, economies of scale and innovative solutions.

Flood protection, basing planning, water quality monitoring, sustainability and climate adaptation, innovative solutions, compliance and enforcement, risk management and pre-disaster preparation are also topics the Dutch water authorities can give assistance (Havekes *et al.*, 2015).

Other local associations related to the RWA are STOWA (Stichting Toegepast Onderzoek Waterbeheer) and the Waterschaphuis. The former in charge of implement knowledge project related to water management, and

the latter implements projects related to ICT (Information, Communication and Technology) (Havekes *et al.*, 2015).

4.2. PARTICULARITIES OF THE RWA

This section gathers data from –professional– contract managers involved in RWA projects. Questions were asked regarding their experience with RWA projects, and the difference between working for RWA and other agencies.

Many RWA are struggling to define functional specifications due to the historical approach of executing projects. They have their own operational staff –operate their own assets– for a long period of time, hence accustomed to perform technical tasks. This situation becomes a challenge when switching from a traditional to more innovative contracting strategy (Baak, 2016; Schouten, 2016).

The difference between projects executed by RWS and RWA are the political influence. In RWS, once the project has started is subject to less political influence during the execution of the project. A decision has been taken by the high hierarchy of the RWS and therefore is subject to less changes. The RWA on the other hand, is subject to the board influence during the execution period, which makes it complicated when decisions already taken are changed (by the board). This happens because of the structure of the board, which is both stakeholder (being influenced by the project) and shareholder (contributing the project).

One example to illustrate how politics can hinder goal achieving in RWA is described: a RWA, has the goal of cleaning the surface water. Greenhouse farmers use and discharge –considerable– large amounts of contaminated water into the soil instead of in the sewers. The RWA must liaise with the municipalities within its jurisdiction, to help controlling and monitoring their farmers to avoid illegal discharging. However, municipalities do not have the same goal as the RWA –clean surface water– (Baak, 2016).

In addition, the RWA must liaise with the farmers and reach consensus in reducing illegal discharging of contaminated water, since using the police as a resource –already used before– only leads to new techniques to hide illegal discharging –creating immunity– (Baak, 2016).

The negotiation with municipalities, farmers (stakeholders and shareholders), government agencies (police) and the governing board becomes challenging since all have different –conflicting– interests and governing structure. Aligning the interests of the parties involved, setting expectations, analysing problems and patterns, and communication skills are highly desired competences in order to solve problems (Baak, 2016; Schouten, 2016).

Baak (2016) states that currently all RWA's chairmans gather together to discuss their problems, their solutions, their competitiveness –gaining National support– in order to improve their performances.

4.3. SUB-CONCLUSIONS

The concepts described in this chapter –and Appendix C– gives a broad overview of the characteristics of entities in charge of the wastewater in The Netherlands: the Regional Water Authorities. There are 23 RWA in The Netherlands and each one of them encircles a specific area in the country. These areas are different from the ones the municipalities and the provinces envelops, since its distribution is based on hydraulic-related purposes. This distribution makes negotiations among them more complex.

One of the most remarkable characteristics of the RWA is their financial autonomy due to their unique levy system, independent from the national, provincial and municipal taxation system, allowing them financial flexibility towards decision making in regards expenditures.

The governance structure peculiarity is explained in their decision making process. Decisions are in charge of the governing board constituted by the very same inhabitants of the area covered by RWA. The governing board is comprised by different stakeholders representatives, which the number of representatives varies depending the nature and dimension of their interest, *i.e.* a region with large percentage of agricultural area has more agricultural representatives in the governing board.

The impact the characteristics of the RWA described in this chapter have in the draft guideline can be summarised in Table 4.1. The table shows the guidelines that must be highlighted or emphasise when conducting the case studies. An explanation of the selection of this guidelines is included in the table.

Table 4.1: *Impacted guidelines because of the characteristics of the RWA*

N°	Guidelines
31	Establish indicators to measure customer satisfaction.
48	Involve the organisation hierarchy levels accordingly to the value of the risk.
54	Strive for cooperative and trustworthy environment with contractor to ease negotiations.
59	Negotiate claims through informal communication to avoid further legal procedures.
62	Encompass the contract management team with skills to start and positively develop long term relationships with stakeholder and parties inside and outside the contract.
65	Strive for constant improvement of the relationships in all management levels.
67	Stimulate cooperative and collaborative approach instead of a duel approach in the relationship.
68	Boost team work and benefit from knowing weaknesses and strengths of the other parties.
69	Avoid resorting the contract terms and conditions every time to demand the contractor to fulfil its obligations.
70	Assign in the contract management team a suitable professional in charge of relationship management.
73	Communicate clearly and straightforward the organisation's service expectative to the contractor to avoid future frustrations.
77	Assess customer satisfaction during the contract lifespan.
93	Discuss lessons learned with contract management team, and with the related party involved –stakeholders, contractors, etc.

If customer satisfaction indicators are set, then the customer satisfaction can be measured. If satisfactory customer satisfaction levels are reached, it means that the customer as well as the governing board of the RWA is satisfied. This way the governing board and the users of the service can give input to check if the goal of the contract is being fulfilled.

Since integrated contracts are becoming popular in the wastewater industry, different levels of risk arise during an integrated contract in comparison to a traditional contract. Involving the hierarchy levels according to the risk means explaining new and more complex risks to the governing board. A risk might differ in magnitude to the different representatives of the governing board due to their difference in their core business.

Due to the high complexity of a contract and large amount of stakeholders RWA faces during a project, it is important to have a constant atmosphere suitable for negotiations. A cooperative and trustworthy environment contributes to such atmosphere. Parties have negotiation sessions with no hidden agenda and are more willing to cooperate. Also when a claim takes place, solving the claim throughout informal communication becomes plausible with the right atmosphere. Parties are more willing to discuss in order to reach an agreement instead cling to contract clauses.

When good relations are developed, the chance of achieving a goal increases. The CMT in a RWA should possess skills to develop a long term relationship, and if not they should be outsource. This is particularly difficult due to the historical and technical approach of executing projects. Soft skills are being disregarded when they are actually very important to fulfilled the guidelines N°62, 65 and 70. The historical and technical approach of executing projects might also hinder the statement from guideline N°73. Instead of explaining the goal of the contract, RWA are used to demand for compliance of technical specifications instead of organisation's service expectative.

The stakeholders the RWA liaise are static entities likes the provinces and municipalities. By static is meant that they will not change in a near future. The same stakeholders can participate in different type of projects;

a municipality and province and another RWA might be involved in different projects. Therefore relationship with these static stakeholders becomes important. The relationship can be enhanced if all management levels know each other before a conflict arises (the usual reason of how high management levels met for the first time). Taking advantage of the other parties strengths and allow to be helped in the areas the RWA is weak also contributes for this relationship.

Discuss lessons learned with contractors and other stakeholders –specifically other RWA– would enhance the way RWA execute contracts. This would help particularly the Unie van Waterschappen by enhancing operations of the RWA. The enhancement lies in the fact the solutions to common problems are standardised speeding up its implementation.

5

CASE STUDY & DISCUSSION

This chapter describes and discusses the results from the evaluation of the dedicated contract management guideline in the case studies –current wastewater projects owned by RWA–. A case study protocol is elaborated and implemented in three case studies projects: Utrecht, Garmerwolde and Venlo. The case study design is shown in Section 5.1, the results of the evaluation are shown in Section 5.2. Finally, the conclusions outlined in Section 5.4 provide the knowledge necessary to answer the fifth research subquestion (See Section 1.4 in page 3).

5.1. CASE STUDY DESIGN

The case study design is comprised of five key components: proposition, question, unit of analysis, logic linking data between proposition and criteria for interpreting the data. The components provide the workflow procedure to achieve the research objective. The diagram in Figure 5.1 portrays that workflow.

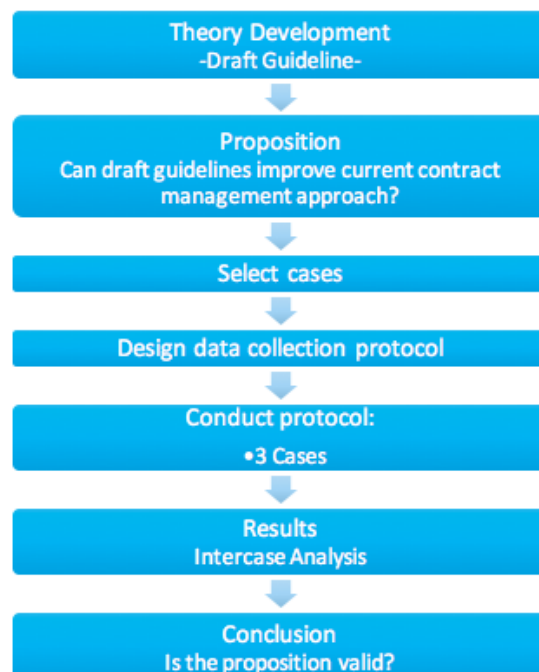


Figure 5.1: Workflow of case study design

The main aim of the case study is to find out if it is possible that the guidelines aimed at services help the current contract management approach of RWA in the wastewater industry. The questions –the research question and the sub-questions– were presented in Section 1.3 & 1.4 respectively.

The units of analysis are the cases mentioned above, which have specific characteristics (described in Section 5.1.1). The quality of the research and logic between the data and the proposition is explained in Sections 5.1.2 and 5.1.3 respectively.

5.1.1. CASE STUDIES

The projects selected for the analysis are three. Each units of analysis contain the following characteristics: client, contractor for the different phases, group in charge of maintenance and operation, contractual strategy –contract type–, phases of contract life cycle being assessed, role and responsibilities of the interviewees.

The summary of the characteristics of the case study are: long-term contracts (including design, construction, operation and/or maintenance), wastewater industry projects with a performance-based contract type, own by RWA and located in The Netherlands. The characteristics of the projects are shown in Table 5.1.

Table 5.1: *Characteristics of selected case studies*

N°	Regional Water Authority	Project Location	Contract	Contractor	Ops. begin	Cost: €x10 ⁶	Project type
1	De Stichtse Rijnlanden	Utrecht	DBM	Heijmans & GMB	2019	120	WWTP
2	Noorderzijvest	Garmerwolde	DBM	GMB & Imtech Infra	2013	20	WWTP
3	Peel en Maasvallei	Venlo	DBMO	Waterschapsbedrijf Limburg & GMB	2013	5.5	Energy fabric

5.1.2. QUALITY OF THE RESEARCH METHOD

Yin (2009) depicts the case study –a research method– quality is judged according to four relevant test for exploratory cases: construct validity, external validity, internal validity and reliability. The theory behind each test and the characteristics of the case study design relevant to the test are described below.

Construct Validity Operational measures are established correctly and appropriate for the studied concepts (Yin, 2009). A case study protocol is proposed (See Section 5.1.3) to determine the steps to be follow for every case study.

External Validity Establish the domain where study findings can be generalised (Yin, 2009). All cases are related to Dutch wastewater industry, have performance-based contract type and are owned by RWA. Two cases are in operation phase, and the other in the design and construct phase. The value -cost- of the project is shown for illustrative matters in Table 5.1 and is not a criteria taken into account for this research. The characteristics of the selected case studies are shown in Section 5.1.1.

Internal Validity This criteria applies only for causal or explanatory studies. Since the case studies are exploratory/descriptive; this criteria is not part of the research design.

Reliability Probing operational steps defined can be repeated and still obtain same results (Yin, 2009). If the same research is with same methodology and same case studies is done (not replicating with other case study) then same results, conclusions and findings should be expected. Reliability lies in the methodology explanation make process steps as operational as possible and easy repeat.

5.1.3. CASE STUDY PROTOCOL

The case study protocol consists in evaluating the dedicated guideline within the case studies. The protocol includes an explanation of the research: introduction, objectives, methodology, hypothesis of the case study, description of the selected cases, explanation of the framework and guideline developed, and finally a semistructured interview to the people with the role of the contract manager of the client side during the contract lifespan.

The interview questions included structured questions and open ended questions, thus a semi-structure approach (Turner III, 2010). The questions are meticulously design to avoid biased response, although there are other factor influencing bias, such as the interviewer, relation interviewer-interviewee, the interviewee, etc (Dijkstra, 1980).

The interview protocol follows the guidelines depicted by Jacob and Furgerson (2012): the research is guiding the questions, the interviewer is following a script, questions are open ended, among others. If the guidelines are followed it is expected to have a successful interview protocol.

In addition, the protocol was reviewed by an external professional–Fang Feng, PhD Candidate, Department of Management in Tilburg University-, and by internal group –graduation committee-. The case study protocol is portrayed in Appendix D.

During the interview, the interviewer followed the recommendations stated by (Kvale, 1996) in regards five key issues for conducting qualitative in-depth interviews: aspects of the interview, qualification criteria for the interviewer, interviewee issues, type of questions, and preparing the interview summaries.

5.2. RESULTS

The results of conducting the case study protocol are shown in this section. A specific subsection will portray the results and discussion of each case study.

The results of each case study can be summarised in three parts, based on what was presented in the protocol (See Appendix D). The first part comprises the perception of the structure (See Figures D.2 & D.3) presented, the second in regards the presence or absence the guidelines during the project lifecycle, and the third one in regard to roles and responsibilities proposed for each phase.

5.2.1. CASE STUDY 1: UTRECHT

Interviewee(s) The professionals interviewed in this case study are the contract manager –A–, the project manager–B– and the former project director –C–, the three of them were in charge of the execution of the project since the beginning of this year. The latter has been changed this September.

The project team comprises the previously mentioned, in addition to the risk manager and technical manager. During the beginning of the design phase there was a wastewater specialist involved.

Current condition of the project The contract comprises the design, construction and maintenance of a WWTP for 10 years. The contractor in charge are Heijmans and GMB. The commissioning is expected by 2019, and the maintenance provision is for the next 10 years.

Preparation works started in the beginning of this year. The design process begin, and it was not until the end of august that the CMT and the contractor team moved to site (Utrecht). The beginning of the construction phase is set up for the beginning of next year.

RESULTS – UTRECHT

In regards the framework The interviewees reach consensus that the framework are complete, and cover most of the areas of managing the specific contract of Utrecht. However they also consider the guidelines are

extensive, and therefore, contract managers might not use them always.

The case study have a special characteristic, during the contract set-up, most of the relationship management elements were implemented during the kickoff meeting. This establishes the basis for a strong client-contractor relationship since the beginning of the contract.

Presence or absence of guidelines For the first phase –contract setup–, a 6 weeks duration kick off meeting was held between the RWA and the contractor. In this meeting many subjects were discussed, and official documents were developed. In fact all guidelines from N° 1-7 were actively executed during the kick off meeting.

The kick-off meeting consisted in a meeting of a duration of 6 weeks where the contractor and the organisation get to know each other. All of the following descriptions are both ways; that means from the contractor to the organisation and vice-versa. The organisation shows and explain the processes they used for payments, for changes, escalation routes. This way the contractor understands why processing a payment takes certain amount of time. Contractor also understands the reasoning behind preparing documentation for payments.

For example the contractor must prepare documentation for requesting a payment. The documents in the beginning might seem extensive for a payment. However in the kick-off meeting, the organisation explains why all those documents must be included in the payment. Therefore the contractor becomes aware of the necessity of every single piece of paper.

The other way around, the contractor explains the organisation the reasoning behind the periodicity of the payments and the implications of a delay. This situation creates financial awareness and also contributes to a collaborative environment.

Furthermore, the organisation chart is explained with their roles and responsibilities. The contractor understand who perform which task in the organisation chart and the other way around. In case the contractor needs to discuss a topic regarding a change or has a technical query, then it is known which is the personnel ideal to solve that particular issue.

The contract is reviewed by both parties, and immediately the interpretation of the contract begins. Every clause explained by the contractor to organisation and vice versa. This way the organisation understands what the contractor understands by the contract. Is a reassurance to check if the contract is being interpreted as it was intended. Before the actual execution of the contract takes place, the organisation can detect if there are discrepancies in the interpretations. If discrepancies are detected they can be amended before they actually take place.

The kick off meeting also include an activity used to detect the strengths and weaknesses of the human resources. Both the organisation and the contractor were part of the activity, and a profile was created for each person. The profile includes the way the person expresses the best –informal communication, email, both, etc–, their preference when dealing with issues –a meeting with the people involved, just by state the desired outcome, etc–, their working personality structured or flexible. Then when the personnel from the contractor side needs to deal with certain personnel from the organisation side, they how which is the best approach to request information, execute a task or simply interact with the other party.

A document developed during the kickoff meeting is the CMP. The contents included in the CMP are –but not exclusively–: reporting structure, change processes, registering information, testing procedures, underperformance procedure, risk management, communication paths and hierarchy escalation.

Regarding the second phase almost all guidelines were taken into account for this case study. The guidelines not taken into account were not applicable due to intrinsic characteristics of the case study, those guidelines are: N° 23, 31,69. Since these topics are covered by the governing board of the RWA.

Documentation was registered in a computer software called Relatics. The software allows the organisation to register documents regarding the contract: periodic reports, processes, changes, progress reports, performance measures, risk register, etc. Thus new information is being updated in the software constantly, allowing the organisation to have a single and updated source of information.

On the other hand the contractor might request information from Relatics, however request may only be granted by the organisation prior review of the request. The information provided to the contractor can only be used accordingly to what was stated in the request. The organisation avoid information being misused, therefore covering to a certain extent the guideline N°23.

A performance management plan is created during the kickoff meeting. The document contains all the processes that take place to measure the performance. A test planning is also included. The test planning states the different aspects that will be tested during the execution of the contract. In addition, explains how it will be measured and which levels are acceptable.

If the performance levels is not met or it is detected that something is wrong, then the contractor is informed by informal communication (just entering the office, phone call). If the severity of the underperformance is high, then the means to inform changes to a higher level (email or letter).

Also after monitoring, a report is made including the information requested according to the test planning. A meeting is conducted to review the results. The periodicity of the meeting relies on the type of tests, also the people involved in the meeting. For example every month a meeting takes place to review the efficacy of the measures used in the test plan, however every three months there is a meeting to review the progress of the contractor and inform the governing board (highest rank in the management hierarchy of the organisation).

The same way the performance is measured and reviewed, the risks are identified, evaluated and mitigated every month. The identification of risks falls in the contractor's liability. However, the organisation can also detect risks, and discussed them with the contractor. The elaboration of the risk register is done by the contractor and reviewed by the organisation. The review consists in determine if the value of the risks are accurate, and evaluating the mitigation measures.

The indications on how the process of the risk detection and risk register elaboration should be done are stated in the CMP. As mentioned before this document is elaborated during the kickoff meeting, therefore it has the contractor and the organisation input.

Change processes were discussed and understood during the kickoff meeting as well. For example, a change escalates the management hierarchy according to the money-wise impact. And when a change occurs, the reason behind the change must be identified. The change is assessed comprehensively and the change procedure is followed according to the CMP.

The relationship management in this particular case study represents exhaustively the guidelines from the research. The CMP contains behavioural rules agreed by the parties. This rules encompass the guidelines stated in relationship management part: specifically N°62-68, 71-73. The behavioural rules depict for example how should the approach be when discussions arise. For example the respect shall prevail during the discussion, and if someone feels offended, the situation should be informed.

The contract also states a follow up meeting similar to the kick off meeting when a new phase from the integrated contract begins. Ensuring new staff involve in the new phase also receives all the information the current staff have.

In regards to the contract closure –third phase–, the contract obeys the terms and conditions of the UAV-GC, which are part of the contract. There is no consideration in the contract in case of changing contractors, thus the guidelines N°82,83 are not applicable.

About responsibilities, competences and awareness Interviewee –B– agreed almost completely with the subject for all the three phases. interviewee –B– stresses on setting the expectations is very important, however considers the technical knowledge in the second phase is not fundamental, yet it helps. This statement could be supported by the fact that the CMT was made up of sufficient professionals with experience in the wastewater industry, thus reducing the magnitude of the importance of this technical competence.

Interviewee –A– agrees with the recommended competences, responsibilities and awarenesses; and considers that during the first and second phase the most important competences of the contract manager is: to be able to detect possible contractual conflicts ahead in time. If so they can be tackled without influencing other aspects of the project. This matches the awareness –of the second phase –constantly overview and evaluate

risks.

Interviewee –C– gives an overview of the contract elaboration and vicissitudes due to his managerial role. Also states that guidelines N°23, 30, 31, 69 are guidelines taken into account in the pre-award phase mainly and also part of the responsibilities of the governing board. It means that they might be considered in a bigger picture, the strategy of the RWA; which includes the case study Utrecht.

ADDITIONAL REMARKS – UTRECHT

Can be concluded that the framework is complete; encompassing the overall contract. The extensiveness of this guidelines makes them suitable for developing the contract management plan at the beginning of the project.

Guidelines could be categorised and grouped in magnitude levels to allow the CMT to designate the appropriate effort to enforce that guideline.

5.2.2. CASE STUDY 2: GARMERWOLDE

Interviewee(s) The people interviewed for this project are two: the project manager –D– and the technical-maintenance team leader –E–. The first was in charge of the project since the beginning of the tender phase –Best Value Procurement methodology was used– until the commissioning of the WWTP. Interviewee –D– also over-sought the operation for the following year. The latter is in charge of all the assets Noorderzijlvest have, being the WWTP of Garmerwolde one of them.

The identification between the phases pre-operation –design & construct– and post-operation –operation & maintenance– was simple due to the fact the interviewees were in charge of pre-operations and post-operations phases respectively.

The project team in the first phase is comprised by the project manager –having also a contract manager role–, technician, civil engineer, wastewater technologist, permits affairs and procurement affairs.

Current condition of the project The WWTP has been operating for a couple of years already, hence currently in the operation and maintenance phase only. The design and build phase was in charge of a contractor, but later the operation and maintenance was in-house work.

The contractor is a joint venture between GMB and Imtech Infra. DHV collaborated with the design –Nereda Technology– of the solution. The contract included the design, construction and 1 year of –testing– operation . During construction, and first two year of operation, an effluent coach was in charge of training the operators of the RWA for that specific project.

The project suffered a complication since the contractor only manage to achieve the functionality too late. Reaching certain levels of service by a specific date guarantee the fulfilment of the year cumulative legal requirements of the wastewater effluent.

The RWA and the contractor extended the scope of the contract. The improvement of the performance of other wastewater treatment facility counter-rest the issue before mentioned.

RESULTS – GARMERWOLDE

In regards the framework The approach of contract management used in this projects has little differences with the one proposed in this research (See Figure 2.4). BVP have a different approach than DBO/M since it merges the procurement phase with the execution. However the guidelines provide an useful framework to be followed by the contract manager.

In regards the general framework: the interviewee –D– indicates is complete and cover all the matters of contract management. It also indicates it could helped back then –during project execution– to promote the use

of key performance indicators instead of monitoring only the scheduling and planning. It could anticipate complications early enough to solve them while reducing cost and general impact in the stakeholders

Interviewee –E– considers the part of ensuring the understanding roles and responsibilities of CMT could help to define expectations, avoid misunderstandings, allocate responsibilities, and detect where there can be room for improvement.

Presence or absence of guidelines There is consensus in the application of the guidelines during pre-operation phase (design and construct). The guidelines corresponding to the contract set up phase were all present. There is a kick off meeting where responsibilities are assigned to the different members of the organisation and the contractor. A contract management plan is elaborated based on the information received from the tender phase and the topics discussed in the kick off meeting. All official documents are registered in the information management system, named Decos, the official software used in the RWA for project documentation.

Regarding the contract management phase, guidelines regarding reporting vaguely present since the reporting was indicated as management by exception; thus only new risks and under-performances are registered in the reports. In addition, UAV-CG terms and conditions states that all reports, risk register, and change documents should be elaborated by the contract which leaves the contract manager of the organisation with low loads of work in regards to these aspects.

Most of the performance measurement elements only were used for the post-operation phase. The procurement method –Best Value Procurement– used management by exception, and the exceptions were mainly risks. BVP doesn't included incentive structures when performance levels are above expected. Because of its nature it also avoids the organisation to fall into onerous commercial terms. Therefore guidelines N°22-23 are not applicable in this case.

The performance levels are monitored periodically by the contractor, and the organisation only is informed when a process or an outcome present values different than what was expected. A complete trust is given to the contractor. This is one of the premises of BPV, the organisation choose the contractor more suitable for the job, based on their capabilities.

Due to the successfulness of the project and because the type of tender/contracting method –Best Value Procurement–, many of the guidelines for change management were not applicable. Changes were not reported unless they represent a burden to the organisation. For example guidelines N°52-55 and N°58-59 are not applicable since according to the interviewee “this was a risk on the side of the contractor, therefore not of our business”. Besides the contract was based on functionality, and the function was not changed during the execution, thus no changes in the contract.

Furthermore the risk management elements were elaborated by the contractor, and only when the risk impacted the organisation it was reviewed by the CMT of the RWA. Identification of risks is done together the contractor with the organisation, but the rest of the process of risk management is held by the contractor. For all the other risks, the organisation did not interfere because it was not necessary.

In the post-operation phase, there is one fundamental critic towards the relationship management elements; the guidelines were acknowledged by the interviewee –E– however, no clear procedure on how to implement them was clear for him. One specific example is the guideline N°67, the interviewee consider it useful, but didn't know how to enforce it.

Contract closure related guidelines are supported by the UAV-GC terms and conditions. There was an absence in developing a contingency plan (N°41), since it is not even though the fact that the contractor might default their responsibilities.

About responsibilities, competences and awareness There was a common agreement by both interviewees in regards what is depicted in the protocol. The interviewee –D– detected a deficiency in the CMT mindset when striving for functionality; an object oriented mentality was ruling. That implied the CMT was focusing on details instead of the overall deliverables in the contract.

ADDITIONAL REMARKS – GARMERWOLDE

Can be concluded that the guidelines are more than sufficient to cover the aspects of the current approach of contract management. Although the procurement method –Best Value Procurement– reduce the usability of the guidelines, they still function as a structured framework to be follow for a successfully manage a contract.

The guidelines were able to help the maintenance/operation phase. The aid was probed useful since the interviewee acknowledge the guidelines from the relationship management (N°62-73) as necessary and rightful. Nevertheless there was struggle on behalf of the interviewee –E– developing ideas to implement these guidelines, and even to include them in a contract.

The general framework and the guidelines helps to allocate and define problems. Also helps structuring the management approach, consequently identifying appropriate actions that increase its efficiency and efficacy.

5.2.3. CASE STUDY 3: VENLO

Interviewee(s) There was only one person interviewed for this project: the project manager –F–. He was present during the pre-design, the execution and during the first year of operation and maintenance of the service. He was able to provide all the information requested for the all phases of the contract lifecycle.

Current condition of the project The innovative project consist in designing, building, maintaining and operating an energy fabric; energy production from sludge. The period since the pre-design –pre-award phase– until the commissioning lasted circa 1 year. The contractor in charge of the project is GMB jointly with Waterschapsbedrijf Limburg. Waterschapsbedrijf Limburg is the entity in charge of 18 WWTP owned by the RWA of Peel en Maasvallei & Roer en Overmaas.

The energy fabric was commissioned by 2013 and is currently operating. The operation and maintenance was extended for a total 10 years to –the same contractor– GMB. After the 10 years of operation & maintenance period is finished, that role is assumed by Waterschapsbedrijf Limburg.

The project suffered a major underperformance –heat exchanger & steam injection related issues– during construction. The severity was enough to change the performance indicators, from technical to financial; allowing the contractor change their proposal as long as they were able to fulfil the financial KPIs. This decision was taken among the directors of the organisation and the contractor. As a result additional and high front end investments were made back in the day.

The project team was comprised by a project manager, civil engineer, electrical engineer, mechanical engineer, technology specialist, cost controller. They were all in charge of the project risks, changes, reports and processes. In addition, there was a contract advisor within the team who provide aid to the project manager during the pre-award phase.

RESULTS – VENLO

In regards the framework The energy fabric follows a similar path depicted in the framework phases, taking into account all the elements from the first and second phase. Even elements of the third phase –due to the underperformance– were abide, which is not common in the other case studies.

The interviewee –F– considers the framework is complete, because cover almost everything he can remember from the contract. The interviewee considers the fact that the guidelines are structured in a chronological gives no additional value, since they have to be done when necessary, phases are just one way perception of CM.

The interviewee –F– states there should be a focus in the contract preparation and elaboration –pre-award phase– in order to have a good contract and ease the management during the post-award phase. Also maintaining the team from the pre-award phase to the post-award phase is beneficial.

Presence or absence of guidelines A meeting is set up in the beginning of the contract to cover guidelines N°1-7 and the ones related to relationship management (N°63-73). This meeting is not written in the contract, yet is a initiative proposed the project manager, and actually his usual way of working. The meeting comprises interpreting the contract both the contract manager of the organisation and the contractor. All documentation from the previous phase is assessed and understood. The scope of the contract, specifications, risk assessment, official procedures, and processes for administrative tasks.

At the end of the kick off meeting, the agreements made between the parties are embodied in a document, which is not part of the contract –therefore no contractual obligations might arise from it– however, it becomes part of the management *modus operandi*.

When the information about the contract is clear for both parties, the responsibilities are assigned to the CMT. The contract manager ensures the staff understands their role, and search for possible liability voids. The outcome of this meeting, becomes a common verbal agreement, but also is registered in a minute of meeting. The minute of meeting is stored in the DMS named Vault.

According to the interviewee –F–, risk, change and documentation elements from the contract management phase of the framework developed, are encompass in UVA-GC terms and conditions. Elaboration of reports, risk management sessions, change procedures are some of the topics depicted in the UAV-GC.

In this particular case, there was an influential underperformance in the contract; spawning discussion between the highest management hierarchy. The outcome: a change in the contract goal executed by same contractor. Therefore a premature contract termination with a contract extension and a evaluation of the contractor included.

The contract termination was done quickly and without jeopardising the goal of the contract. Actually the goal of the contract was enhanced, because that was the solution agreed in order to fulfil the first goal of the contract.

It is worth mentioning, that some of the guidelines that were not included in the contract, are covered by organisation management strategy: contractor evaluation, CMT selection, lessons learned and even risk allocation, etc.

About responsibilities, competences and awareness The interviewee –F– agrees feebly with the responsibilities, competences and awareness statements. In general, for a contract there should be a presence of these skills: open-mindedness, communication, assertiveness, risk management, honesty and trustworthiness.

Another point that gains weight is capabilities of forecasting problems, detecting risks ahead in time and follow proper escalation procedures when problems arises.

ADDITIONAL REMARKS – VENLO

It can be concluded from this case study that the guidelines were substantially covered in this case study by three systems organisation strategy, project manager and the contract. The combination of these systems provides sufficient resources to the CMT to cover the guidelines in their CM approach.

The guidelines were not always present in a contractual agreement document (i.e. contract, formal letters, etc). Yet, they were active in the contract management approach, and therefore operational and functional.

The framework is seen as one way of portraying CM, there are other representations of managing a contract. The magnitude of importance of the type of representation is low, and overweighted by other concepts; *i.e.* the goal of the contract.

Finally, competences, responsibilities and awarenesses stated in the guidelines give guidance to the organisation when defining the CMT within available staff or when outsourcing human resources.

5.3. DISCUSSION

This section shows in a four rank level if the guidelines are put in practice fully extent (✓), to a certain extent (~), not contemplated (∅) or not applicable (N/A) in the contract. An intercase discussion is made for each phase, and in more detail for Phase 2.

The contract setup guidelines have been addressed by all case studies to a certain extent. Table 5.2 shows how the case studies comply with guidelines.

Table 5.2: Comparison – Phase 1: Contract set-up

Guideline N°	Utrecht	Garmewolde	Venlo
1	✓	✓	✓
2	✓	✓	✓
3	✓	✓	✓
4	✓	~	✓
5	✓	✓	✓
6	✓	~	✓
7	✓	✓	✓

The guidelines from the first phase were largely used in the three case studies. However in the case study Garmewolde the exploitation phase lacked a process of assigning roles and responsibilities and conducting a kickoff meeting in the begin of the maintenance phase. Lacking to assign roles and responsibilities generates issues because there are moments when tasks are not done. For example; the staff A thinks staff B will do the task, and vice-versa; at the end the task is not done by either one.

Conducting a kickoff meeting at the beginning of the contract is a common practice in the three case studies, yet the content of what is discussed in the kick off meeting varies. All of them include activities such as contract interpretation, development of a contract management plan and assigning roles and responsibilities.

Table 5.3 shows how the case studies comply with guidelines in regards the document management element from the Phase 2: Contract Management.

Table 5.3: Comparison – Phase 2: Contract Management. Document Management

Guideline N°	Utrecht	Garmewolde	Venlo
8	✓	~	✓
9	✓	~	✓
10	✓	~	N/A
11	✓	N/A	✓
12	✓	✓	✓
13	✓	✓	✓
14	✓	N/A	✓
15	✓	✓	✓
16	✓	N/A	✓
17	✓	✓	✓
18	✓	✓	✓
19	✓	✓	✓
20	✓	✓	✓
21	✓	✓	✓
22	✓	N/A	✓
23	✓	N/A	✓
24	✓	✓	~
25	✓	✓	~
26	✓	✓	✓

Documentation is being managed similarly among the three case studies. Developing a document management system is still lacking in the maintenance phase of the Garmerwolde case study. This had create issues

when searching for reports of the assets of the wastewater treatment plant. The documents are present, however not organised as the case studies from Utrecht and Venlo.

The fact that Garmerwolde had the BVP approach, it highlights the fact that document management activities are less present in their contract management approach. This is due the fact that more documentation is prepared and kept by the contractor instead of fully sharing like the other two case studies.

Table 5.4 shows how the case studies comply with guidelines in regards the performance measurement element from the Phase 2: Contract Management.

Table 5.4: Comparison – Phase 2: Contract Management. Performance Measurement

Guideline N°	Utrecht	Garmewolde	Venlo
27	✓	✓	✓
28	✓	✓	✓
29	✓	✓	✓
30	✓	✓	✓
31	N/A	∅	✓
32	✓	✓	✓
33	✓	✓	✓
34	✓	✓	✓
35	✓	✓	✓
36	✓	✓	✓
37	✓	✓	✓
38	✓	✓	✓
39	✓	✓	✓
40	✓	✓	✓
41	~	N/A	N/A

In regards to the performance measurement a pattern in almost all the guidelines. This implies that performance measurement is considered common during the management of a contract. The measures each case study uses for their contract varies, nevertheless mainly present.

In Utrecht and Garmerwolde cases, there are no indicators for measuring customer satisfaction. The conclusion is that the CMT is not in charge of this task, and they assume that when the contract was developed it was already taking into account the users demands.

Another particularity is that in the three cases there is no contingency for changing contractors in case the fall into underperformance. This is completely understandable since delivering a service in the construction industry is much more complex than other type of service. For example the service of cleaning the windows of a building or providing transportation service to a group of people inside an organisation are services that are easily replaceable because of the large amount of service providers, and also are not indispensable in case the service fails. In the construction industry the complexity limit the amount of service providers, and the cost of replacing one can have large costs.

Table 5.5 shows how the case studies comply with guidelines in regards the risk management element from the Phase 2: Contract Management.

Not surprisingly risk management becomes a standardised way of working among the RWA. The processes are standardised and understood easily by the contractor and the organisation. However, risk detection still has room for improvement. The varieties and the uncertainties given in the construction industry are the drivers for a common management of risks.

Table 5.6 shows how the case studies comply with guidelines in regards the change management element from the Phase 2: Contract Management.

The change procedures are in place during the execution of a contract. The three case studies have in their documentation the necessary steps to follow in case a change arise. Yet, case study Garmewolde using BVP approach experience changes (perceivable by the organisation) less frequently, actually in this case were no changes. This happens due to the fact the role of the contract manager on behalf the organisation only sees

Table 5.5: Comparison – Phase 2: Contract Management. Risk Management

Guideline N°	Utrecht	Garmewolde	Venlo
42	✓	✓	✓
43	✓	✓	✓
44	✓	✓	✓
45	✓	✓	✓
46	✓	✓	✓
47	✓	✓	✓
48	✓	✓	✓
49	✓	✓	✓
50	✓	✓	✓

Table 5.6: Comparison – Phase 2: Contract Management. Change Management

Guideline N°	Utrecht	Garmewolde	Venlo
51	✓	N/A	✓
52	✓	N/A	✓
53	✓	N/A	✓
54			
55	✓	N/A	✓
56	✓	✓	✓
57	✓	✓	✓
58	✓	N/A	✓
59	✓	N/A	✓
60	✓	✓	✓
61	✓	N/A	✓

and participates in changes that impact the goal of the contract. All the construction small changes are bear by the contractor and rarely informed to the organisation.

Table 5.7 shows how the case studies comply with guidelines in regards the relationship management element from the Phase 2: Contract Management.

Table 5.7: Comparison – Phase 2: Contract Management. Relationship Management

Guideline N°	Utrecht	Garmewolde	Venlo
62	✓	✓	✓
63	✓	∅	✓
64	✓	✓	✓
65	✓	∅	✓
66	✓	∅	✓
67	✓	✓	✓
68	✓	✓	✓
69			
70	✓	∅	✓
71			
72			
73	✓	∅	✓

Relationship management was widely implemented during the kickoff meeting by the case studies of Utrecht and Venlo. Activities were designed for encouraging the relationship growth between contractor and organisation. The case of Garmerwolde didn't apply many of the guidelines of relationship management during the post award phase. The reason behind it is that this was already implemented in a previous stage of BVP, before the award of the contract.

While conducting the case studies guidelines 54 and 69 were not clearly understood by any interviewee, therefore it was decided to leave them out of this discussion. Guidelines 71 and 72 are considered repetitive after

interviewing all interviewees.

The contract closure guidelines have been poorly addressed by all case studies. Table 5.8 shows how the case studies match with the guidelines.

Table 5.8: Comparison – Phase 3: Contract Closure.

Guideline N°	Utrecht	Garmewolde	Venlo
74	✓	~	✓
75	~	~	✓
76	✓	~	✓
77	~	~	✓
78	✓	~	✓
79	✓	~	✓
80	N/A	N/A	✓
81	✓	N/A	N/A
82	N/A	N/A	N/A
83	N/A	N/A	N/A
84	✓	~	N/A
85	✓	N/A	N/A
86	✓	~	∅
87	✓	N/A	✓
88	N/A	~	✓
89	N/A	~	✓
90	N/A	~	✓
91	N/A	~	✓
92	✓	~	✓
93	✓	~	✓

Regarding the first 6 guidelines in this phase, they were acknowledged by the interviewees, however not yet used since the contracts are still running. Case in Venlo was the exception since they had to change to contract goal, thus cancel the current contract and create a new contract.

In regards to the premature contract termination, has a similar explanation given for guideline 41. Although the construction industry is prepared and acknowledge the possibility of changing contractors, the way the guidelines aimed at service try to help, are not suitable for integrated contracts in the wastewater industry. These guidelines are 82 and 83.

An extension of the contract is possible, and included in the term and conditions of the UAV-GC, were not used by case studies Utrecht and Garmewolde, thus the interviewees were no sharp in this subject. Same situation happen with performing a contractor evaluation: already executed by Venlo case and implemented after the construction phase of the Garmewolde. In the case of Utrecht an evaluation of the performance is not yet possible, due to the fact that during the interview the contractor haven't completed a task to be assessed.

5.4. SUB-CONCLUSIONS

Case Study Protocol The case study protocol design is based on recommendations for conducting successful exploratory cases and composed by 5 key elements: proposition, questions, unit of analysis and logic link between proposition and interpreting criterion.

The best practices for conducting case study protocol were applied in the case study protocol. Part of the case study protocol are the semistructured interviews, and contains structured and open ended questions.

The case study protocol was successful in the evaluation of the framework (containing the dedicated guidelines) in the three case studies.

The time-based framework provided a structure for conducting the interview. The guidelines help identifying

the contract management approach currently used in Dutch wastewater industry.

Case study assessment It can be concluded from the case studies that the guidelines were widely used during the execution of the post award phase of the contract. The contracts have the following characteristics: long term, innovative and performance based contract of the Dutch wastewater industry.

It was proved that almost all guidelines from 1st and 2nd phase were by some means implemented in the contract management approach of the case studies.

The guidelines belonging of 3rd phase of the CM framework were not widely used because the case studies did not present change of contractors. Changing contractors during DBO/M contract is not a common practice according to the statements of interviewees.

Moreover, this guidelines (3rd phase) are taken into account in the UAV-GC terms. Thus, if UAV-GC terms and conditions are included in a contract, guidelines from the contract closure phase are most likely to be enforced.

The developed framework facilitates the assignation of roles and responsibilities within the CMT. Ergo the accountability become increases effectiveness (knowing who is accountable) and efficiency (avoid loosing time inquiring the non-accountable).

It also defines parameters and concepts in the contract management environment. Terminology universalisation accelerates detection of issues as well as clarifying and understanding causes and consequences of common situations.

Three possible ways of implementing the guidelines were detected: by including them in the contract, the organisations operating modality takes them into account and the CMT implement them in a formal or informal way.

Since the framework is time-wise based, the relationship management elements (included in the 2nd phase) are recommended to be implemented after the contract set-up. Nevertheless a common agreement by all interviews agrees relationship management guidelines should be implemented in the beginning of the contract.

6

CONCLUSIONS

This research has developed a contract management framework with guidelines suitable for design, build, operate and/or maintain performance based contracts in the Dutch wastewater industry. This chapter is divided in four sections. Section 6.1 answers the research subquestions and the main research question. Section 6.2 discusses recommendations. Section 6.3 portrays limitations of the research and Section 6.4 recommends topics for future researches.

6.1. CONCLUSIONS

6.1.1. ANSWERS TO THE RESEARCH QUESTIONS

The conclusions of these research are based in the answers for each research sub questions and the main research question.

Sub question 1: What are the relevant elements of international contract management guidelines currently found in the literature?

For the research, six guidelines aimed at services from UK, Australia and New Zealand were used. They strive for a successful contract management on behalf of the governmental entities (client side). The analysis of the selected worldwide guidelines provide the basis for the elaboration of a framework for contract management. The framework consists of three phases organised chronologically: contract set-up, contract management and contract closure.

The first includes startup activities such as: conducting a kick-off meeting, developing contract management plan, appraising the outcome of tender documents. The second phase includes recommendations to successfully manage the following areas: documents, performance, risks, changes and relationships. And the third provide advices for the closure of the contract: ensure obligations are fulfilled, possible early termination or extension of the contract.

The outcome is illustrated by guidelines accommodated in the framework structure. The guidelines cover the areas needed by the CMT of a governmental agency to fulfil a successful contract of services.

Sub question 2: To what extent current contract management practical approach supports the elements of international guidelines?

The interviews with contract managers in the Dutch environment supported the framework thoroughly. The criteria for assessing the support is qualitative. Support by practical viewpoint is considered when a topic present in the guidelines is discussed widely during the interview. The interviews provide sound support to the framework elements.

The main topics mentioned during the interviews were related to payments, changes, relationships, monitoring and underperformance. And the least mentioned included the ones in the contract closure phase, although the interviewees acknowledged the high workloads of clerical and administrative tasks.

In addition, the outcome of the interviews help defining the cornerstones of contract management: the good practices, the team and the concept. The three of them are bonded by the goal of the contract. The good practices relates to the elements contained in the guideline elaborated in this research. The roles, competences, responsibilities and precautions of the contract managers are included in the team cornerstone. Characteristics of the construction industry are included in the conceptual cornerstone: uniqueness, varieties, difficulties, improvements and desires. The overlapping of roles between contract managers and other professionals was not able to be determined in the research.

Sub question 3: To what extent the characteristics of the entities in charge of engaging wastewater treatment infrastructure in The Netherlands impact the draft guideline from sub-question 1?

There are 23 Regional Water Authorities distributed on the surface of The Netherlands and part of their duties is the wastewater management, thus in charge of the infrastructure projects developments. The main characteristics of RWA are described below.

RWA have an historical approach of executing projects and operate the infrastructure by themselves. The governance structure is comprised by a chairman, a executive committee and a governing board: constituted by a representative quantity of stakeholders groups. The financial system levies localised taxes for the wastewater activities. Their spatial coverage implies dealing with municipalities, provinces, the government and other RWA when establishing and developing a project.

These characteristics support the conclusion that elements from the draft guideline that should be stressed when appraising RWA projects are: the relationship management, effective communication, negotiating skills, establishment development and enhancement of long lasting relations.

Sub question 4: To what extent the dedicated guideline helps RWA's current contract management approach in the wastewater branch?

A case study protocol is designed and executed in the selected case studies. The case studies selected comply with the characteristics described so far: long term, projects including exploitation phase and using performance-based contracts in the wastewater industry. After the assessment of the guidelines in the case studies it can be concluded that the guidelines are complete and suitable for the selected cases. Consequently, the framework with its guidelines constitutes a starting point of the contract management approach.

The phases depicted in the framework, in addition to the elements, subelements and activities were widely present in the current contract management approach of the wastewater related projects of the RWA. The framework is implemented in their approach in three ways: by including them in the contract, because they are part of the organisation operation modality, or throughout formal (letter, memorandums) or informal (emails, casual communication) methods issued by the contract management team.

Main Research Question: To what extent existing contract management guidelines and contract management expertise are helpful for the current contract management approach in Design, Build, Operate and/or Maintain contracts for the wastewater industry in The Netherlands?

Appealing research subquestion's answers is necessary for answering the main research question.

The comprehensive presence of the guidelines in the case studies, underpins the main research conclusion; the framework with guidelines can provide aid to the current contract management approach in the Dutch wastewater industry.

The aid provided relies in giving a defined structure of contract management. The provided structure eases assignment of roles and responsibilities within the contract management team and makes accountability of

them effortless. Furthermore, having a list of guidelines to be performed during the lifetime of the contract helps to prioritise tasks and activities.

It also contributes to define parameters and define concepts regarding contract management. The universalisation of concepts and procedures, helps identifying possible causes of problems, thus facilitating the search for solutions.

Specifically, the first phase (contract set-up) and the relationship management element are useful to define an initial meeting among the organisation and the contractor(s). This meeting can be conducted by a dedicated professional in charge of developing professional relations, lasting during the contract lifecycle and beyond.

The two research objective is fulfilled in one hand by providing a worldwide and overarching concept of contract management in the shape of a framework with guidelines for good practice. And on the other hand, the RWA when executing long term, DBO(M), performance based contract can be benefited when applying the framework in their contract management approach.

6.1.2. CONCLUSIONS

A guideline for the management of a contract in the Dutch wastewater industry should include at least the issues of setting up a contract, document management, risk management, change management, relationship management the perks of closing a contract. Now with an evolving and integrated way of contracting, these issues become momentous when managing the contract. The elements more important are when to intervene in the contract, reaching consensus in contract interpretation, dealing with goal changes, lack of experience of the team, keeping updated information of the contract and expectations not properly set.

The guidelines are suitable for integrated contracts where a service is provided besides the infrastructure, because the guidelines are functional oriented the same as the integrated contract. The framework can guide the contract managers in a changing contracting environment, and be useful in newly methodologies for procurement such as BVP.

With integrated contracts an emphasis should be done in the interphases of each stage. The stages of the contract management subject to more instabilities are the transitions; from design to construction and construction to operation. The guidelines show what are the activities that needs to take place for strengthen the links between stages. The specific guidelines providing that strength are:

The framework has 93 guidelines and the way to prioritise them is by assessing which guidelines give more value if applied. The guidelines that give more value are the ones covering the difficulties the contract manager encounter now a day. Those guidelines are explained below.

Assign clear roles and responsibilities (4) set up a kick off meeting (6) and discuss the contract thoroughly with the parties until full comprehension is achieve: scope of work, monitoring measures, customer satisfaction, pending matters from tender phase(7). This guideline enables fully understanding of the interpretation of the contract of the contractor and helps defining the expectative and promote collaboration between the contractor and the organisation. Besides it helps the risk detection by showing clearly where are the blind spots, the responsibilities not being covered by the contractor or the organisation.

Develop and maintain a Document Management System (DMS) for managing information and providing a single source of truth (9) Identify, gather and record relevant updated information in the DMS (13) are important to avoid delays due to change procedures because information for analysing the change is updated and accurate.

Confirm the clearness and measurability of performance indicators with the contractor (28), define realistic scales of performance for all indicators to provide a scale for establishing incentives to the contractor when over achieving standard level of performance (30) and ensure the value/cost ratio of the measures is increasing during the lifespan of the contract (35) because then the best performance of the contractor is being awarded and value for money is being constantly achieved. The organisations avoid stagnation with a contractor in a long term contract.

The guidelines that belong to the relationship management elements (62-73), help the CMT to focus on the

soft skills and the consequences of it are numberless. Due to the fact that soft skills are enhanced, the relationships is also improved. With a good relationship negotiations are easier to reach consensus while striving for the benefits of both the contractor and the organisation. A good relationship also promotes an environment for collaboration and understanding each other business core, and achieving the goal of the contract even with a poorly written contract.

The wastewater construction industry builds infrastructure that are so complex and specific, that even when having clauses in case the contractor falls in default, the contract managers are not thinking about changing contract, and considered is an option in a extreme case.

6.2. RECOMMENDATIONS

The first and most important recommendation the research can give to contract managers of any field and industry is to use the guidelines provided here for managing a contract in the wastewater industry with an integrated contract.

Monitoring can be a cumbersome activity in the beginning, later on the service provided stabilises and the task becomes tedious. Management by exception should be implemented for processes impacted by this tediousness. This application allows the staff to focus on the important aspects, rather than distribute effort in all tasks evenly. Management by exception states for reporting irregular aspects, instead of all aspects (as depicted by the guidelines).

Categorised the guidelines, in order to separate them according to the type of tender/contracting method. The categorisation should involved prioritisation of the guidelines as well. The result of this process encourages its use. Also avoids them from being just another document collecting dust in the shelf of a contract manager's office.

Utrecht case study validation A presentation of this research was given to a group of professionals involve in the case study Utrecht. The participants were interviewee –A,B,C–, contractor contract manager, client legal contract advisor, current project director (position occupied by interviewee C) and the technical manager from the client side. The feedback accrue from the presentation depicts the following:

- The recommended kick off meeting including the contract set-up and relationship management elements should be repeated or followed up during other phases of the project. In the particular case of DBO/M, a follow up meeting covering the guidelines should at least be conducted before beginning of operation.

The following meetings after the kick-off will refreshen the topics mentioned in the kick off meeting, also will include give information to fresh staff that weren't present during the first meeting. The new staff will be provided with information sufficient to understand the current policies in the contract. Also new policies might arise fulfilling the current needs.

6.3. LIMITATIONS

Some limitations were encountered while carrying out this research. The limitations are related to the methodologies used: desk research, interviews, the case studies.

Desk Research

Literature about contract management was limited. Other sources depicted guidelines for the US market (Albano, 2013; Norby *et al.*, 2004), the Dutch market (for Contract Commercial Management, 2011) and also for the worldwide market (Carter *et al.*, 2012). However, they were not retrievable or accessible neither by the researcher or the entities sponsoring the research, at the time they were required.

Despite the objective of developing a guideline to help the Dutch market, it was not possible to apprehend information in the Dutch language due to a language barrier. The addition of this sources might provide a different (theoretical) insight to the current practices in the dutch construction industry, specifically in the wastewater industry.

Most of the literature researched in regards to the guidelines are produced by the Commonwealth countries, which may be considered as biased. The original idea was to conduct a desk research with worldwide documents.

Case Study

The characteristics demanded to the projects for being eligible as a case study were very specific. This specificity limited the number of case studies available to be subject to the evaluation in order to substantiate the research. One proposed case study had an active legal procedure, and because of privacy reasons information was not able to be retrieved.

One of the case studies which already agreed to contribute to the research had to be dismissed. Situations beyond the control of the researcher and the proposed interviewees from the Harnaschpolder case, impede the enforcement of the assessment.

Interviews

In some cases, the interviewee's role was the one of a project manager fulfilling the contract manager's role as well. This happened due to the composition of the project team, consequently was difficult to detect overlapping scope between contract management and other roles. Regrettably, the investigation of this overlapping scope was an expected outcome of this research.

The results of the interviews are limited to a certain extent to each interviewee's power of retention capabilities. The duties, responsibilities, experiences and general behaviour are subject to what the interviewee recollects, and not the precise facts. One example is that there are guideline that might be present in the contract but not used during the contract lifespan. The research failed to detect this situations because of lack of recollection of the interviewee.

6.4. FURTHER RESEARCH

It would be interesting to conduct a similar research in a different country, and analyse the possible implications of culture differences in the contract management approach. The outcome in the Netherlands show stress in the soft skills –relationship matters–, perhaps it would be different in another country with prominent cultural differences.

Since there was the limitation of sources in the dutch language, the contribution of these sources, specifically for the Dutch market would be of great value. For example, the influence of documentation prepared by RWS in regards contract management could contribute to the guideline's completeness (or vice-versa).

In some cases, the interviewees were project managers fulfilling the position of the contract manager, it would interesting to research the difference between the contract and project managers roles and responsibilities. These would certainly give an overview of overlapping tasks and responsibilities, and thus provide sufficient knowledge to allocate these efficiently.

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CONTRACT MANAGEMENT DRAFT GUIDELINE

A.1. PHASE 1: CONTRACT SET-UP

Refer to Section 2.3.2 in the main document.

1. The contract management team is in charge of process and transmit all the information from one phase to another. (GPCMF, 2008)

Contract set-up

2. Receive and process the handover information from the tender phase, includes contract, specifications, risk assessment, scope of work, legal documentation, warrants, etc. (GPCMF, 2008; OGCMF, 2014)
3. Develop the contract management plan with the contract management team (Elsley, 2007; GPCMF, 2008; OGCMF, 2014)
4. Assign clear roles and responsibilities within the contract management team (Elsley, 2007; GPCMF, 2008; OGCMF, 2014)
5. File all formal documentation in the information management system (OGCMF, 2014)
6. Set up a kick off meeting to discuss contract with contractor and other related parties (OGCMF, 2014)
7. Discuss the contract thoroughly with the parties until full comprehension is achieved: scope of work, monitoring measures, customer satisfaction, pending matters from tender phase. (OGCMF, 2014)

A.2. PHASE 2: CONTRACT MANAGEMENT

Refer to Section 2.3.3 in the main document.

Document Management

8. Provide updated, accurate and consistent information to the related parties regarding the contract topics (Elsley, 2007; McPhee, 2012; PSC, 2002; OGCMF, 2014)
9. Develop and maintain a Document Management System –DMS- for managing information and providing a single source of truth (Elsley, 2007; McPhee, 2012; GPCMF, 2008; ICNNZ, NA; PSC, 2002; OGCMF, 2014)
10. Have an updated list of contact of the people from different parties –and the organisation– involved in the contract (McPhee, 2012)

Document management system

11. Inform about relevant changes in the contract to the related parties (Elsey, 2007; McPhee, 2012; OGCMF, 2014)
12. Have a digitalised and hard copy of all formal documents in the DMS (GPCMF, 2008)
13. Identify, gather and record relevant updated information in the DMS (McPhee, 2012; PSC, 2002; OGCMF, 2014)

Performance records

14. Elaborate performance reports based on information accrue by other members of the contract management team (PSC, 2002; OGCMF, 2014)
15. Record underperformance events in writing with parties' acknowledgement (OGCMF, 2014)

Periodic reports

16. Elaborate reports within the agreed periodicity, based on information accrue by other members of the contract management team (Elsey, 2007; GPCMF, 2008; ICNNZ, NA; OGCMF, 2014)
17. Ensure periodic reports are complete according to contract terms and conditions but also fulfilled reflect information needed for the contract management team and other related parties. (Elsey, 2007; ICNNZ, NA; PSC, 2002)
18. Ensure periodic reports are supported with the correspondent attachments (Elsey, 2007; PSC, 2002; OGCMF, 2014)
 - Payment slips
 - Outstanding guarantees
 - Insurance in force
 - Progress schedule and cost control
 - Performance monitoring
 - Organisation's assets maintenance
 - Changes
 - Updated risk register

Payments

19. Determine if the service provided comply with the service level agreed in the contract before processing the payment, with the help of performance reports (McPhee, 2012)
20. Follow the payment procedure according to the contract terms and conditions. (McPhee, 2012; GPCMF, 2008)
21. Payment processes and mechanisms are defined and in place (McPhee, 2012; GPCMF, 2008; ICNNZ, NA)
22. Incentive structures are based on desired outcomes, with appropriate approval procedures (GPCMF, 2008; PSC, 2002)
23. Avoid the organisation to fall into onerous commercial terms, such as price escalation or compulsory payments without added value (GPCMF, 2008)

Communication

24. Establish official media for communication with each party involve in the contract (McPhee, 2012)
25. Refer parties to the DMS when requesting information (McPhee, 2012)
26. Determine level of importance of which communication should be registered the DMS only and which should also be notify to the related parties. (McPhee, 2012)

Performance management

27. Create a Performance Management Plan including the following: Key Performance Indicators, service level agreements, frequency or periodicity of measurement, procedure for evaluation of results and contingency plan for underperformance. (McPhee, 2012; GPCMF, 2008)

Key Performance Indicators

28. Confirm the clearness and measurability of performance indicators with the contractor (Elsey, 2007; GPCMF, 2008; ICNNZ, NA; PSC, 2002; OGCMF, 2014)

29. Ensure the indicators are comprehensively understood for all parties and aligned with contract objectives (ICNNZ, NA; PSC, 2002; OGCMF, 2014)
30. Define realistic scales of performance for all indicators to provide a scale for establishing incentives to the contractor when over achieving standard level of performance. (McPhee, 2012; GPCMF, 2008; PSC, 2002; OGCMF, 2014)
31. Establish indicators to measure customer satisfaction (Elsey, 2007; GPCMF, 2008)
Monitoring, assessment and amendment of KPI's
32. Consider the value of the outcome of the measuring should be larger than the cost of measuring the indicator (Elsey, 2007; MCPhee, 2012; PSC, 2002)
33. Review periodically the monitoring outcome to detect possible underperformance (McPhee, 2012; OGCMF, 2014)
34. Review periodically the efficacy of the measures, assess them and reconsider if necessary (McPhee, 2012; ICNNZ, NA; OGCMF, 2014)
35. Ensure the value/cost ratio of the measures is increasing during the lifespan of the contract (Elsey, 2007; MCPhee, 2012; GPCMF, 2008; PSC, 2002)
36. If signs of underperformance are detected, communicate with the correspondent parties to find a solution (McPhee, 2012)
37. Provide feedback to the contractor regarding their performance (McPhee, 2012; GPCMF, 2008; OGCMF, 2014)
Underperformance
38. Identify the underperformance's causes and consequences for the parties involved (McPhee, 2012; OGCMF, 2014)
39. Assess the severity of the underperformance, if low, informal communication with contractor should be enough, if severe, discuss with contract management team and contractor to revert situation and reduce magnitude of consequences (McPhee, 2012; OGCMF, 2014)
40. Inform stakeholders and related parties about the underperformance (OGCMF, 2014)
41. Part of the contingency plan is to consider the possibility of changing contractor (McPhee, 2012)

Risk Management

42. Use a risk register as a tool for risk management in case there non in the contract, otherwise continuously updated the risk register stated in the contract. (Elsey, 2007; MCPhee, 2012; GPCMF, 2008; OGCMF, 2014)
Risk Register: Identification, mitigation and evaluation
43. Identify risks –and opportunities–, with cause and consequences, assign impact and probability values (Elsey, 2007; MCPhee, 2012; GPCMF, 2008; OGCMF, 2014)
44. Elaborate mitigation measures and contingency actions, consult suitable professional according to the risk nature (Elsey, 2007; MCPhee, 2012; GPCMF, 2008; OGCMF, 2014)
45. Rank risks according to their value for further assessment (Elsey, 2007; GPCMF, 2008; OGCMF, 2014)
Assigning responsibilities
46. Contract management team is responsible for the risk bear by the organisation (Elsey, 2007; GPCMF, 2008; PSC, 2002)
47. Assign risks within the contract management team to the best suitable professional profile (Elsey, 2007; PSC, 2002)
48. Involve the organisation hierarchy levels accordingly to the value of the risk (GPCMF, 2008)
Ongoing risk review
49. Review and update the risk register periodically (Elsey, 2007; GPCMF, 2008; ICNNZ, NA; OGCMF, 2014)
50. Reassign risks to the party best suitable to bear them in case of change of conditions

Change Management

51. Develop Change Management Plan, with appropriate change/variation/dispute procedures in line within the organisation regulations (Elsey, 2007; McPhee, 2012; PSC, 2002; OGCMF, 2014)
Causes of variations
52. Identify the reasons behind changes, claims of disputes (Elsey, 2007; McPhee, 2012; PSC, 2002)
Change management
53. For changes or claims –unresolved with informal communication–, escalate the appropriate management hierarchy (McPhee, 2012; PSC, 2002; OGCMF, 2014)
54. Strive for cooperative and trustworthy environment with contractor to ease negotiations (PSC, 2002)
55. Assess changes comprehensively, repercussions to parties and stakeholders (McPhee, 2012; OGCMF, 2014)
56. Follow the change's procedure from the change management plan (McPhee, 2012; OGCMF, 2014)
57. Communicate change's effects to the related stakeholders (McPhee, 2012; OGCMF, 2014)
58. Changes are made using contractual provisions and provide value for money (Elsey, 2007; GPCMF, 2008; PSC, 2002; OGCMF, 2014)
Legal claim avoidance
59. Negotiate claims through informal communication to avoid further legal procedures (McPhee, 2012)
60. Follow hierarchy escalation in the organisation management when solving a claim according to CMP (McPhee, 2012)
61. Consider further procedures to solve a claim involves mediation, arbitration and litigation (McPhee, 2012; PSC, 2002)

Relationship management

62. Encompass the contract management team with skills to start and positively develop long term relationships with stakeholder and parties inside and outside the contract (Elsey, 2007; McPhee, 2012; GPCMF, 2008; PSC, 2002)
Stakeholder management
63. Promote clear, open, frank and peer-to-peer communication with parties related to the contract (Elsey, 2007; GPCMF, 2008; ICNNZ, NA; PSC, 2002)
64. Ensure information transmitted is effective, understandable, on time and avoiding ambiguities (GPCMF, 2008; PSC, 2002)
65. Strive for constant improvement of the relationships in all management levels (Elsey, 2007; McPhee, 2012; PSC, 2002)
66. Guide proper escalations within organisation management hierarchy (Elsey, 2007; ICNNZ, NA; PSC, 2002)
67. Stimulate cooperative and collaborative approach instead of a duel approach in the relationship (McPhee, 2012; ICNNZ, NA; PSC, 2002)
68. Boost team work and benefit from knowing weaknesses and strengths of the other parties (Elsey, 2007; PSC, 2002)
69. Avoid resorting the contract terms and conditions every time to demand the contractor to fulfil its obligations (Elsey, 2007)
Long-lasting relationships
70. Assign in the contract management team a suitable professional in charge of relationship management (Elsey, 2007; McPhee, 2012; PSC, 2002)
71. Develop attitudes that promote an honest, trustworthy long term relationship (Elsey, 2007; McPhee, 2012; ICNNZ, NA; PSC, 2002)
72. Ensure communication roles and responsibilities of the team involved in the parties (McPhee, 2012; GPCMF, 2008; ICNNZ, NA; PSC, 2002)
73. Communicate clearly and straightforward the organisation's service expectation to the contractor to avoid future frustrations (GPCMF, 2008; PSC, 2002)

A.3. PHASE 3: CONTRACT CLOSURE

Refer to Section 2.3.4 in the main document.

General contract closure

74. Ensure all obligations and responsibilities are fulfilled by all parties to set a clear termination of the contract (OGCMF, 2014) (McPhee, 2012)
75. Evaluate fulfilment of contract goal and main objective (McPhee, 2012; OGCMF, 2014)
76. Confirm all payments and financial closure (McPhee, 2012; OGCMF, 2014)
77. Assess customer satisfaction during the contract lifespan (OGCMF, 2014)
78. Release warrants and insurance with the suppliers accordingly (McPhee, 2012; OGCMF, 2014)
79. Proceed with the administrative closure (McPhee, 2012)
80. Assert all materials and borrow equipment have been returned to the correspondent supplier/contractor (McPhee, 2012; OGCMF, 2014)
81. Terminate all access into the project to the contractor and other parties (McPhee, 2012; OGCMF, 2014)

Premature contract termination

82. Ensure smooth transition between new and current contractor: (Else, 2007; MCPhee, 2012; GPCMF, 2008)
 - Service is being delivered up to the standards uninterrupted
 - Customer satisfaction levels are constant
83. If possible, allow the new and old contractor to work simultaneously and transfer of information takes place (McPhee, 2012; GPCMF, 2008)
84. Reduce risk of falling into service unavailability (McPhee, 2012; GPCMF, 2008)

Contract extension

85. Be aware of key dates to dispose enough time arrange contract extension (McPhee, 2012; GPCMF, 2008; ICNNZ, NA)
86. Assess current contractor in regard to performance (McPhee, 2012; ICNNZ, NA)
87. Evaluate the value/cost ratio between extending a contract to current contractor and a new procurement process within the market (McPhee, 2012; ICNNZ, NA)

Contractor performance evaluation

88. Execute and analyse the contractor performance in regards to contract terms and conditions (McPhee, 2012; ICNNZ, NA; OGCMF, 2014)
89. Evaluate relationship with contractor during contract lifespan (OGCMF, 2014)
90. Discuss contractor performance evaluation with management level of the organisation to finalise evaluation (McPhee, 2012; OGCMF, 2014)
91. Register evaluation accordingly in the organisation's files

Lessons learned

92. Record and file lessons learned as they occur during the contract lifespan (McPhee, 2012; OGCMF, 2014)
93. Discuss lessons learned with contract management team, and with the related party involved – stakeholders, contractors, etc- (McPhee, 2012; OGCMF, 2014)

*Marcos Solís Madrigal
Rotterdam, December 2016*

B

CM GENERAL INTERVIEW PROTOCOL

B.1. INTERVIEW STRUCTURE

Date:

Location:

Interviewee:

Interviewers:

B.1.1. INTRODUCTION

Dear Sir/Madame,

This interview is presented to you by a group of students from Delft University of Technology, who are conducting a research as a final step of their master award of Construction management and engineering. The questionnaire is a collaborative attempt at collecting more data regarding the general concept of contract management in infrastructure and building environment, and thus to contribute to the body of knowledge regarding this field. The information gathered from your practical experience as contract/project managers is very important in making our research a success and it will be used solely for study purposes and not otherwise.

Graduate Students:

- Wouter Eitjes
- Marcos Solis
- Georgi Vachev
- Polina Veleva
- Lisette van Wijngaarden

In this interview the focus is on the realisation phase. We would like to ask you to answer all questions with this in mind. However, if you can find links within different phases, please elaborate on this.

- Broad, general, starting point, practice to
 - ◇ Background
 - ◇ Client/ Contractor/ Consultant
 - Educational background
 - How many years of experience? Career path (working experience only in public sector or private as well?)
 - What kind of contracts?
- Innovative contracts, DBFM, DBFO...
- Infrastructure/ Building
- Best Value Procurement, Performance measurement

GENERAL QUESTIONS ON CONTRACT MANAGEMENT

This set of questions will be general questions on contract management: how it is viewed by the contract manager and what the tasks and responsibilities are.

1. What is contract management to you?
2. What do you think is the main purpose/goal of contract management?
3. How does contract management change when the parameters of projects change?
Parameter: complexity, type of contract, level of risk, repetitive or new projects
4. Which competences of a contract manager are important in the realisation phase? (what exactly he/she thinks his position of a contract manager is)
5. What are the main responsibilities for a contract manager?
6. What are the main difficulties for the contract manager?
What is your first answer?
Do you concur that the main difficulties are:
 - (what role do you see for the contract manager in)
 - Translating the client's objectives/goals/wishes into contract terms
 - Dealing with stakeholders
 - Change management
 - Conflict resolution
7. What is unique for contract management in the built environment (construction industry)?
8. How does contract management relates to project management?
9. Can you tell us how the other phases (planning/tender) of the contract management lifecycle impact the realisation (construction/operation/maintenance) phase?

PERFORMANCE MEASUREMENT

This part aims at investigating the general concept and drivers for performance measurement as a first step for further elaboration on the topic. First, it will try to get an overall idea of what project success means to different stakeholders and what are the most important criteria they use to measure it.

Q methodology explanation:

A methodology of studying subjectivity by ranking a number of elements. A distinction between success factors and success criteria should be made and explained.

- Success criteria are: the set of principles, standards or measures used to judge the success or failure of a project? (Korbijn, 2014, p.9)
 - While the success factors are: the set of circumstances, facts, or elements which, when influenced, increase the likelihood of success? (Korbijn, 2014, p.9).
This interview will focus on success criteria.
10. Having in mind the projects who have been involved, what do you think is the most important in measuring your project success?
Additional questions should be asked:
 - about the first 3 criteria ranked with most important and least important role
 - why the neutral criteria are ranked as neutral
 - how do you think you can influence those criteria (in which project phase? Which are the other stakeholders influencing it)
 - do you have any criteria missing from the list
 11. What are the current processes/ strategies to use performance measurement in your organisation?
 12. Does performance measurement have an added value for the project success or for your organisation? (define your main drivers for measuring the performance of the contractors or your own organisation)

13. In what way does the information you received from the measured performance during the execution of the project (and on its final submission) support your decision-making process on a daily basis and help you steer the project towards a certain direction?
14. What are the difficulties of measuring performance?
15. Who should be involved in the development of performance measurement? Do you think contractors should be engaged in the development of performance measures, as they will oversee their own work? Engaged means they do it themselves, or be part of it?

RELATION AND EXPERIENCES

As contract manager, you are dealing with the different parties of the contract.

16. What do they want to achieve with collaboration, what is the outcome ?
17. How do you ensure/support/create collaboration in contract management? (trust) Do you have the tools for this?
18. Do the other parties also share an interest in collaboration?
19. Have you experienced changes in the scope of a contract? Can you tell us some experience?
20. In managing a conflict, what are the most important drivers for decision making?
21. What can be currently improved in management of contracts?
22. What would you like to change about the way contract management is performed at this moment? (swot)

CLOSING OF INTERVIEW

Thank the interviewee for the participation

23. Do you have any final remarks regarding this interview? Something else need to be add on your behalf/perspective?
24. At a later stage, would you be willing to participate in an additional survey/interview?

B.2. SUCCESS CRITERIA

Rank the following success criteria according to the following classification of increasing magnitude: Not important, slightly important, neutral, quite important and very important.

Table B.1: Interview Protocol: Success criteria

N°	Success Criteria –description–
1	Meeting budget: <i>Iron triangle - The total cost of the project does not exceed initial (base line) cost at the beginning of the project.</i>
2	Meeting schedule: <i>Iron triangle - The total duration of the project does not exceed the initial (base line) duration at the beginning of the project.</i>
3	Meeting technical specifications (the quality): <i>Iron triangle - The project meets the technical requirements determined at the beginning of the project and comply with the established quality standards.</i>
4	Fit for purpose: <i>The project forms the best solution for the problem for which it was initiated. It is the best choice given the different alternatives.</i>
5	Safety: <i>Within the project attention is paid to the safe design and the prevention of accidents during the execution, the use and maintenance.</i>
6	Efficient use of allocated resources: <i>The resources (capital, labor, materials) allocated to the project, are used in the most cost-efficient and time-efficient manner..</i>
7	Satisfies needs of project team: <i>The employees of your project team are able to achieve their personal goals and there is a good work atmosphere.</i>
8	Satisfies needs of stakeholders: <i>The stakeholders of the project are defined as those people and organisations that have an interest in the environment, performance and outcome of the project. They are not directly involved in the project, but they do have strong influence (environmental organisations, civilians, governmental organisations). These stakeholders have a specific interest and they are able to promote it in the project..</i>
9	Satisfies needs of users: <i>The end users are satisfied with the final functionality of the project..</i>
10	Satisfies needs of client: <i>Client organisation is satisfied with the general result from the project. The project meets their initial requirements.</i>
11	Satisfies needs of the shareholders: <i>The shareholders are cofinanciers the project, but they are not the commissioning party. They have interest in the project, which they are able to promote..</i>
12	Profitability for contractor: <i>The contractors is able to profitably execute his part of the project.</i>
13	Effect on the professional image of client organisation: <i>The project contributes positively to the reputation of the client organisation.</i>
14	Continuation of client organisation: <i>The project contributes to the continuation of the client organisation and achieving the organization's goals.</i>
15	Personal growth: <i>The employees of your project team are able to professionally and personally develop themselves further through the experience of this project.</i>
16	Knowledge acquisition: <i>The client organisation learns from this project (e.g. acquiring new knowledge, new experiences, getting familiar with new technologies) and this knowledge will be applied in subsequent projects to improve the performance of the organisation.</i>
17	Technological impact: <i>Based on their experience from the project, the organization develops new technologies or product lines.</i>
18	Impact on the environment, sustainability: <i>Within the project the effects of construction activities on the environment are taken into consideration.</i>
19	Economical and social impact: <i>The project contributes to the economical improvement of the area.</i>

Source: Adapted from (Van Loenhout, 2013)

B.3. CONCEPT DEFINITION

Contract management Contract management is the process in which full compliance of the obligations of all parties in an agreement is ensured, in order to meet the operational objectives of the contract (Bos, 2014). The purpose of the contract management framework is to provide a clear and standardised approach to managing and administering contracts for goods and services purchased from suppliers. The main objective of contract management is to ensure commitments and obligations from buyers and suppliers are effectively met, by delivering value for money outcomes and managing inherent risk. Contract management is the key step to manage the contract in order to successfully deliver the goods/services at the agreed level and costs, to the agreed timeframe, with minimal risks (Elsley, 2007).

Complexity It is proposed that project complexity be defined as 'consisting of many varied inter-related parts' and can be operationalised in terms of differentiation and interdependency (Baccarini, 1996). "In terms of organisational complexity, *differentiation* would mean the number of hierarchical levels, number of formal organisational units, division of tasks, number of specialisations etc.; *interdependency* would be the degree of operational interdependencies between organisational elements. In terms of technological complexity, *differentiation* would mean the number and diversity of inputs, outputs, tasks or specialities; *interdependency* would be the interdependencies between tasks, teams, technologies or inputs. (Baccarini, 1996, p.289)" Complexity relates to the degree of interaction of all the elements that comprise P3 management and is dependent on such factors as the level of risk, range of stakeholders and degree of innovation (APM, 2006).

Uncertainty Project complexity is often considered as being caused by uncertainties. Perminova *et al.* (2008) introduced a new perspective on uncertainties in projects and how to manage uncertainties in projects. They give an explanation about the link between uncertainties and risk management. Whereas traditional risk management scholars assumed risk is uncertainty. They rather understands risk as one of the implications of uncertainty. They defined uncertainty as "a context for risks as events having a negative impact on the project's outcomes, or opportunities as events that have beneficial impact on project performance" (Perminova *et al.*, 2008, p.76)

Realisation phase

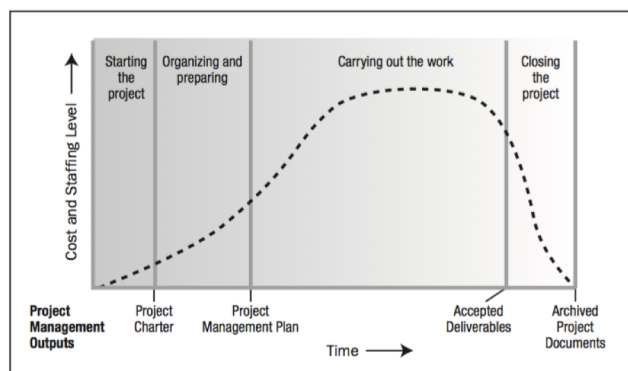


Figure 2-1. Typical Cost and Staffing Levels Across the Project Life Cycle

Figure B.1: Project lifecycle

Source: PMI (2001)

Contract management life cycle The process of systematically and efficiently managing contract creation, execution and analysis for maximising operational and financial performance and minimising risk (Elsley, 2007).

Change management Change management is a structured approach to moving an organisation from the current state to the desired future state (APM, 2006).

Stakeholder management Stakeholder management is the systematic identification, analysis, planning and implementation of actions designed to engage with stakeholders. It is a set of techniques that harnesses the positive influences and minimises the effect of the negative influences. It comprises four main steps: (1) Identify stakeholders, (2) assess their interest and influence, (3) develop communication management plans, (4) engage and influence stakeholders. Identifying stakeholders will be done using research, interviews, brainstorming, checklists, lessons learned and so on. The stakeholders and their areas of interest are usually shown in a table known as a stakeholder map. Typical types of stakeholders will include: (1) individuals and groups performing the work, (2) individuals and groups affected by the work, (3) owners, shareholders and customers, (4) statutory and regulatory bodies (APM, 2006).

Risk management Risk management is a process that allows individual risk events and overall risk to be understood and managed proactively, optimising success by minimising threats and maximising opportunities (APM, 2006).

IPM Integrated Project Management model, which are implemented in the organisation with five key roles, each with its own discipline and often conflicting interests. The five key roles are (1) project management, (2) project control, (3) stakeholder management, (4) technical management, (5) contract management (Rijkswaterstaat, nd)

Performance measurement Neely *et al.* (1995) defines “Performance measurement is the process of quantifying the efficiency and effectiveness of an action.” Where the terms *effectiveness* refers to “the extent to which customer requirements are met”, while *efficiency* measure “how economically the firm’s resources are utilised when providing a given level of customer satisfaction” Performance measurement is generally defined as regular measurement of outcomes and results, which generates reliable data on the effectiveness and efficiency of programs. https://eca.state.gov/files/bureau/performance_measurement_definitions.pdf

System based contract (SBC) <https://www.rijkswaterstaat.nl/zakelijk/zakendoen-met-rijkswaterstaats-werkwijzen/werkwijze-in-gww/systeemgerichte-contractbeheersing.aspx>

Project success The common assessment of the success of construction projects is: delivered on time, to budget, to technical specification and meet client satisfaction (Morris and Hough, 1987; Pinto and Slevin, 1988). However, today it is considered that the criteria for success are in fact much wider, incorporating the performance of the stakeholders, evaluating their contributions and understanding their expectations (Atkinson, 1999).

Project success factors (Korbijn, 2014, p.9) “The set of circumstances, facts, or elements which, when influenced, increase the likelihood of success”

Project success criteria (Korbijn, 2014, p.9) states “the set of principles, standards or measures used to judge the success or failure of a project”

C

REGIONAL WATER AUTHORITIES

C.1. HISTORY

[Havekes *et al.* \(2015\)](#) describes history of Regional Water Authorities as follows: data since the 13th century, therefore running for over 800 years and becoming one of the oldest entities in the world. Good common sense to counteract the perennial natural disasters Netherlands faces (flooding), causes the RWA want to collaborate and work together. A sample of it occur in 1920 when water authorities of each province became members of each province's association –provincial water authority unions– with the goal to safeguard the interest of the regional water authorities. Later on, in 1927 was created an organisation with the goal to safeguard the interest of the RWA at a national level –Association of Provincial Regional Water Authorities–, all provincial regional water authority unions were members. The level of organisation was prominent, specially when they were circa 2650 water authorities operating in The Netherlands by 1950. However, after the flood of 1953 several small water authorities were rendered to its end, Zeeland province for example; used to have more than 300 water authorities, nowadays there is only one RWA in Zeeland.

The collaboration continues growing and by 1968 all Regional Water Authorities were members of the Association of Provincial Regional Water Authorities, from then on named Dutch Association of Regional Water Authorities. The same year a Study Commission is created by the Minister of Transport and Public Works to examine the function and structure of the water authorities and the interactions with other governmental entities.

In the last decade changes were imminent for the governance structure of the RWA, already in 2008 and for the first time political parties, interest groups and local groups participated in the RWA elections for their governing board, furthermore the water authority board changed with the Water Authorities (modernisation) Act, by disregarding the seats of the board for building and lessee's representatives, and introducing nature area managers.

In 2010 a Delta Programme was created, their members (National government, provinces, municipalities and RWA) were under the management of the Delta Commissioner, participating in Delta Decisions in order to cope with environmental changes for 2050.

In previous years' collaboration in-between governments has increased, in May of 2011 was signed the Administrative Agreement between Regional Water Authority, provinces and local governments and Association of water companies, to promote the intergovernmental cooperation. The collaboration has been expanded beyond Dutch borders and in 2012 an initiative was established by Peter Glas, where various organisations from over 30 countries work together to improve the governance of water management.

However, there has been time when some detractors of RWA arises, also in 2012 with the creation of the Rutte-Asscher Cabinet in the House of Representatives, the RWA became a delicate subject, since the recommendation of replacing/merging the RWA into new 5 regions (former 12 provinces and the dismiss of water authorities from the Dutch Constitution were proposed to the Government.

The description given by the OECD in March 2014 regarding the water governance in The Netherlands: Dutch Efficient organisations in charge of water management are a global reference, contributed to House of Representatives' decision to dismiss the former proposition of the 5 regions and reduced number of RWA. One of the latest permute in regards to the RWA's governance structure took place in 2015 by the Rutte-Asscher Cabinet, implementing a change in the Water Authority elections, by combining them with the Provincial Councils to increase the 24% turnout in the elections of 2008.

The legislation the RWA abides has also changed over the time. Back in 1978 the Dutch House of Representatives supported the government's intention to redact a RWA act. Five years later the RWA act changed its status from possibility to necessity, as stipulated in the revision of the Dutch Constitution. Finally, in 1992 the RWA Act became a reality and began its legislation. A legislative proposal to modernise the RWA Act was accepted by the Parliament in 2007, and two years later the Water Act came into force, integrating previous water laws from all fields of water management which were created individually upon every disaster or critical situation, ignoring the interwoven relation among them. Later on 2011 agreements were incorporated in the Administrative Agreement on Water to gradually increase efficient gains of €750 million annually by 2020. Additional and important means were given to RWA in 2012, the faculty to punish administratively in regards to light violation of the bye-laws.

A large change in the current legislative framework is expected to take place in 2018, back in 2014 the Dutch government sent a proposal to the House of Representatives to merge various legislations regarding the physical living environment (Water Act, Spatial Planning Act, Environmental planning Act, Environmental Permit and the Crisis and Recovery Act) into one Environmental Planning Act.

Tasks and responsibilities have a history within the RWA. In 1970 the quality water management and wastewater management were included in the responsibilities of the water authorities. Later in 1977 the Dutch government published a memorandum where includes three conditions for good water governance: water management should be managed efficiently, executed locally where possible, and take place after evaluating stakeholders interest.

In 2005 the government steer the activities of the RWA into integrated water management, and included tasks such as surface water and groundwater in regards of quality and quantity, in addition to the already carried by RWA. The amendment of the RWA Act in 2011 includes new tasks to be carried on by RWA: pest control of the muskrat and coypu. And most recently, the water authorities seek beyond the traditional wastewater treatment process, and engaged the use of smart technologies in 2014: Energy Factory and Raw Material Factory. The financial structure (including funding, levies and tax collection) has suffered many changes since its inception in 1920, when the real estate levy was introduced, in order to cope with real estate owners' largest interest: have a reliable flood defence system.

During the critical financial crisis after the World War, the Dutch Association of Regional Water Authorities issued 2 long term bonds loans and took private loans in 1950 to finance projects for the RWA. The flood of 1953 impacted the financial structure of the RWA, an example is that 1954 the Nederlandse Waterschapsbank (NWB) was found after reaching a level of consensus from the Regional Water Authorities.

Other possibilities to finance the activities come along with the levies, in 1970 RWA was granted the provision of a surface pollution levy to finance infrastructure for wastewater treatment. Four years later, a report from the Study Commission is published alleging that future local and regional water governance should be executed by the Regional Water Authorities and that the principle interest-pay-say should remain as axiom in the governance system. The principle implies that those interest in activities of the Regional Water Authorities should pay and also have a saying in the decision making.

The financial framework became solid when in 1981 the state of The Netherlands agreed to support and collaborate with the NWB by collaborating in the shared capital of NWB. In 1995 the residents levy was declared a separate tax collection category; and since the residents were the largest contributors for the financial treasury, they also became the largest representative group in the governing board. In 2009 the surface water pollution levy rescinded when the Water Authorities (modernisation) Act defined transport and treatment of wastewater as a separate task, therefore creating a new wastewater treatment levy.

The NWB has become a cornerstone in the financial funding demanded by the RWA, furthermore to fund international projects, in 2006 created the NWB Fund to finance international project drawn by RWA in cooperation with international entities.

Most recently the RWA began contributing to the strengthening of the primary flood defence (2011) and further in 2015 the contribution reached 50% of total income for that category.

In 2014 NWB collaborated with €20.5M to the NWB Fund, today NWB designates €800 000 yearly to the NWB Fund. Same year the Nederlandse Waterschapsbank celebrates its 60th anniversary and became directly supervised by the European Central Bank (ECB).

C.2. DUTIES AND RESPONSIBILITIES

The Regional Water Authorities are the governmental body in charge of the water management in The Netherlands. Water Management comprises different activities depending upon the geographic and topographic characteristics, physical needs, climate change, current legislation and residents' demands. In a country where half of the country's area is below N.A.P., flood safety becomes a large menace to the residents. Water is essential for human life, flora and fauna; and like any other country it is a collective need. Providing clean water and discharging treated sewage into surface water are the other main activities to be executed by RWA. Other activities are included in the list of task and responsibilities of the RWA, however they are exceptional cases for each RWA. These activities are non stopping, for this the RWA employs more than 11 000 employees, circa 1% of the public servants in The Netherlands.

FLOOD SAFETY

Flood protection a critical activity to undertake due to the fact that circa 40% of population is below N.A.P., failing to perform it in a satisfactory way would compromise the life of millions inhabitants. This crucial responsibility carried out jointly by the central government and the RWA. The State in charge of protecting the coastline and dams in the west estuaries, and the latter in charge of ring dykes, water catchment, river dunes, water basins, among others. RWA currently manage a length of 3600 km of primary flood defence, 13 500 km of other types of flood defences. (Havekes *et al.*, 2015)

CLEAN WATER PROVISION

RWA provides a healthy environment for the water creatures remain plenteous as well as clean water for leisure and recreation. Also providing sufficient water for the farmers and their agricultural activities, thus agricultural products becomes affordable, healthy and available for all the residents. Provision of clean water is hence measure in quality and quantity.

The quantity is managed similarly to flood protection in the sense that the responsibility is managed mutually by the state and the RWA; being the state in charge of large surface water (North Sea, IJsselmeer Lake, Waden Sea, and few canals), and the RWA are in charge of the regional and local water bodies. Achieving this responsibility means for the RWA manage a length of 235 000 km of water courses and operate circa 3 700 pumping stations according to Havekes *et al.* (2015). Main objective is to provide not in excess nor scarce but sufficient water. Quality on the other hand is a separate activity and is mostly returning the used water to the water bodies, the specific topic is described below.

WASTEWATER TREATMENT

Water management in regards to water quality strives to met the standards and legislations towards mainly discharge of residence and business wastewater, but also water bodies for recreational use (bathing water). Havekes *et al.* (2015) depicts that RWA operates in total 360 wastewater treatment plants treating 22.5 million pollution units (in 2 billion m³ of wastewater) across the country.

OTHER ACTIVITIES

There are other activities performed by the RWA (depending on the arrangements of the RWA, municipalities and provinces) that are not part of their core commands and have to be fulfilled.

The activities performed by only some RWA are the following: operation of the groundwater systems; specifically water withdrawal, control of muskrats and coypus; to prevent damage of water structures, waterways maintenance; sheet pile and water depth maintenance, road maintenance; RWA currently maintain 7500 km of roads.

Other activities performed by entities rather than RWA however related to water management are the sewerage system (carried out by Municipalities) and potable water provision (privately regulated).

C.3. FINANCIAL SYSTEM

Oosters (2016) states that in 2015 the total income from taxes of RWA accrue €2.7 billion, 1.7% of the total tax burden in The Netherlands. On the other hand, Oosters (2016) also indicates the operating net cost rose €2.6 billion. From the total expenditure 40% (largest share) goes to waste water treatment plant construction/operation.

The RWA are capable of financing themselves in order to build the necessary infrastructure required to fulfilled their responsibilities and goals. The taxation system is explained below.

TAX SYSTEM

It is important to state that the taxes collection from the RWA are separately from other taxes, therefore decisions on the budget are not evaluated against other government obligations such as education, military, health, etc. Havekes *et al.* (2015) states that taxes are based on five principles: beneficiary pays, polluter pays, cost-recovery, solidarity and legality.

1. Beneficiary principle: the principle idea is that the inhabitants who enjoy the benefits of the RWA activities shall contribute money-wise.
2. Polluter pays principle: every resident or business discharging wastewater into the sewerage system or surface water has to pay, the amount of the payment relies on the contamination amount, therefore compensating monetarily the impact on pollution.
3. Cost-recovery principle: this briefly indicates that with the means of levies the RWA recover the cost of their investments and operational cost, therefore allows the RWA to collect taxes in different categories: wastewater treatment, surface water pollution and water system.
4. Solidarity principle: The water system and water pollution levies are collected jointly in the sense that income from that tax is expended in different project by democratic decision; the stakeholder's demands are taken into account, but not always fulfilling everyone's demand. The wastewater treatment levy is on the other hand exclusively destined for transport and treatment of wastewater.
5. Legality principle: the legal basis of the levies RWA are legally bound are stated in RWA Act and the Water Act, in addition bye-laws are implemented (based in those Acts) in the regulations of each RWA. As seen above, the levies have specific use: water system, surface water pollution and waste water treatment; in the sense that each levy is use in that particular activity, much different from state tax where tax collected is accrued and the distributed in the different tasks.

WATER SYSTEM

The water system taxes are targeted to protect the region against flooding, water quantity and quality management activities. According to the RWA Act, there are different tax categories from which the RWA collects: residents, owners of open land (farmers), owners of nature areas and owners of building and business. This is exactly the same way the governing board of the RWA s composed. The tax for the residents is equal for each household (living space), for the farmers and nature land owners is based on their surface area of their land, and business pay based in the value of their real state.

SURFACE WATER POLLUTION AND WASTEWATER TREATMENT

These two levies are similar and only differ where the wastewater is discharge: sewerage system or surface water. The tax calculation method is therefore also similar, assessing the pollution units being discharged. For surface water, the pollution units are appraised on the oxygen demand. For waste water treatment are also appraised with oxygen demand plus the heavy metals and salt levels.

Besides levies, there are other financial sources the RWA can call for if needed. In fact, together they have created a financial entity, a bank to help financing project within the water management of the RWA; the Nederlanse Waterschapsbank, explained in detail below.

NEDERLANDSE WATERSCHAPSBANK N.V

In 1954 the Nederlandse Waterschapsbank was created in order to cope with the financial stress and infrastructure demand after the WWII and the flood of 1953 respectively. The Dutch Association of Regional Water Authorities (currently Unie van Waterschappen) functioned as an intermediary between the RWA and the financial entities to gather funds for the water governance related projects, after this task become too difficult to handle and enough RWA were supporting the idea of a financial entity fit-for-purpose; the bank was created.

The bank increase in size and trustworthiness that even the State of The Netherlands contributed in the capital stock. The continuous growth and the comprehensive financial scheme of the RWA have given the bank the capabilities to provide services such as: long-term loans, contemporary financial services, function as a treasury for all RWA, high rated financial knowledge and low interest rates.

The NWB has now the same status as the State of The Netherlands according to the financial rating services of both entities Standard Poor and Moody's (AAA and Aaa respectively), providing the on of the highest level of creditworthiness.

NEDERLANDSE WATERSCHAPSBANK NV IN FIGURES

Groenewegen (2016) shows that nowadays the proficiency of the NWB has allowed them accrue an income of €180 million in 2015, and with only 55 people registered in their staff. The total operating expenditure was €39 million also in 2015, and net profit close to €94.7 million.

Groenewegen (2016) also indicates that the lending amount reached €7.4 billion and can be divided between four main actors: RWA 27%, municipal authorities 14%, healthcare institutions 4% and the largest share is owned by the housing corporations with 50%.

*Marcos Solís Madrigal
Rotterdam, December 2016*

D

CASE STUDY PROTOCOL

D.1. INTRODUCTION

Dear Interviewee:

I have developed a semi-structure interview protocol in order to gather results and further substantiate the objective of this research. For this I will provide with information I consider necessary to better understand the topic and delimitate the subject into the desired scope.

After this introduction the research objective is shown, next the research design. The interaction between interviewee and interviewer begins in Step N°4. If you wish to understand the findings in this research so far I recommend to begin reading now. If time was an issue strongly recommend to follow items a) and b) of Step N°4. This can take between 30min to 45min, depending on each case.

D.1.1. RESEARCH OBJECTIVE

The research objective is twofold; to contribute to the contract management body of knowledge by creating a framework with guidelines for people in charge of managing contracts within an organisation, and to provide recommendations to enhance/improve the contract management approach in the Regional Water Authorities by comparing the set of guidelines with the current practice.

The research objective which is going to be answered with the case study methodology is the second.

D.1.2. SCOPE

The scope of this research includes the definition of contract management; as the activities to be performed by a contract manager once the contract is awarded –disregarding the tender process– and until the obligations of the contract are fulfilled –contract ends–. Besides, the research is aimed at contract managers of the public sector, specifically in the Regional Water Authorities working in the wastewater industry.

D.1.3. RESEARCH DESIGN

The case study research design is portrayed in the Figure D.1. Each rectangle represents a step to be followed according to the case study theory (Yin, 2009). Each step is briefly explained in this section.

STEP N°1

The theory found during the research is that contract management can be divided in 3 phases, each phase comprised by elements and sub-elements. The phases of contract management and the elements of each phase are depicted in Figure D.2, in blue and white boxes respectively.

The 2nd phase of managing the contract is divided in 5 areas (sub-elements) with different recommended activities to be executed by the contract management team. These areas are shown in Figure D.3

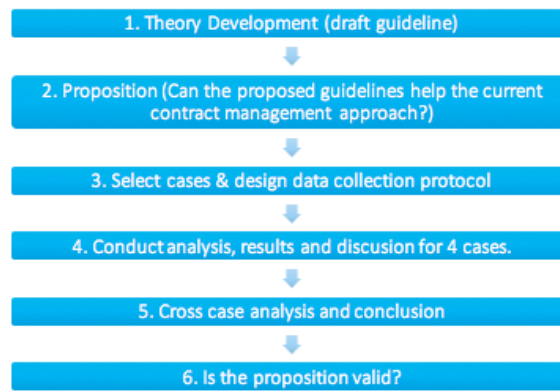


Figure D.1: Case study research design

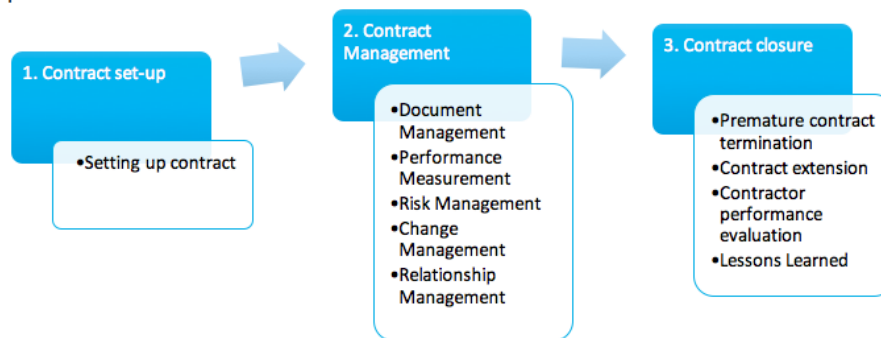


Figure D.2: Phases of Contract Management



Figure D.3: Areas of phase 2: Contract management

A set of guidelines has been developed, covering all phases of contract management (See Section D.2).

STEP N°2

The proposition to be evaluated with the case study approach is; to measure the level of helpfulness the guidelines have on the current management of contract's approach.

STEP N°3

The case studies have been selected with the following characteristics:

- Type of project: Waste water related.
- Contract type: Contracts including design, build and one or both long term phase: maintenance and/or operation.
- Client viewpoint, hence owned by Regional Water Authorities.
- Including characteristics of a performance based contract.
- Ongoing contract during any lifecycle phase –design, construct or exploitation–.
- People interviewed, are either part of the design/construction phase, the exploitation-maintenance-operation phase, or both.

The projects selected are shown in Table D.1

Table D.1: *Selected case studies*

N°	Regional Authority	Water	Project Location	Contract	Contractor	Oper. begin	Cost: €x10 ⁶
1	De Stichtse Rijn-landen		Utrecht	DBM	Heijmans & GMB	2019	120
2	Delfland		Harnaspolder	DBFO	Delfluent	2006	363
3	Noorderzijvest		Garmerwolde	DBM	GMB & Imtech Infra	2013	20
4	Peel en Maas-vallei		Venlo	DBMO	Waterschapsbedrijf Limburg & GMB	2013	6

STEP N°4

The case study begins here. For each case study the following inquiries will be part of the interview in order to gain information about how the guidelines are present in the current contracts of each case study.

Before starting with the case studies, a pilot case helped to deurate and debugged the Section D.2. The following steps should be followed during the interview.

- (a) Show and explain the Section D.2. Column 1 and 2 comprises the phases and elements shown in Figure D.2 respectively. Column 3 and 4 does the same for sub-elements and activities shown in Figure D.3 respectively.

Column 4 includes precisely the activities recommended for the contract managers, the source of these activities are in parenthesis.

- (b) There is a box of roles and responsibilities for each phase, which are accrue from interviewing contract managers.

We would like your opinion in the competences, responsibilities and awareness (elements to have under control) of contract managers during the phases of the contract, to be filled in column 6.

- (c) Fill in column 5 the following way: If you recognise those guides (column 4) as one that took place in the contract, indicate in which phase of the contract was present (it could be possible to be present in more than one phase).

Next for column 6 <should be filled only if columns 5 is present in at least one phase> the interviewee should indicate and specify in what way it was stated (if possible?): i.e. the clause of the contract, the reference of a minute of meeting. If it can't be specified, please indicate how it was present: i.e. formal correspondence, informal communication, an email, etc.

This exercise pretends to detect if the recommended actions are or were present during the contract.

A set of questions are followed after Section D.2 has been filled and completed. This is a standardised open-ended questions where each interviewee is asked the same open-ended questions (Turner III, 2010).

- (i) May you describe to what extend do you consider the framework structure for contract management presented in Figure 2 and Figure 3 is complete and accurate?
- (ii) What would be the elements/sub-elements of the framework structure you consider are missing, or on the other hand are overrunning?
- (iii) For each element (or sub-element) can you describe a guideline that is missing, by missing can be understood that would be considered necessary for the development of a contract?

The following questions have a general interview guide approach design (Turner III, 2010), the areas of information the researcher wish to inquire are:

- (i) The reason behind the addition or removal of elements or guidelines proposed by the interviewee.
- (ii) Inquiry to discover strength and weaknesses of the current contract management approach of each case study.

The interview is finished by now.

STEP N°5

To be concluded after finishing case study interviews

STEP N°6

To be concluded after finishing case study interviews

D.2. DEDICATED GUIDELINES

Case Study Nº _____ Interviewee _____ Date _____

1. Timewise	2. Elements of the phase	3. Sub-elements of the phase	4. Guidelines	5. Recognition of the guideline being present in the current contract approach? Please indicate NO or if so, the phases where the guideline is recognizable (D:Design, B: Build, O: Operation, M: Maintenance)	6. If YES, indicate where is the evidence: a) Contract clause; b) Minutes of meeting; c) Common verbal agreement; d) Other (indicate)
1 Contract set up	1.0 Roles and responsibilities		<p>Competences: Open minded, organised, asertive Responsibilities: Ensure parties understand their scope. Strive for functionality more than product specification Awareness: Real expectations of the contract are described, transparency.</p>		
			1. The contract management team is in charge of process and transmit all the information from one phase to another. (NAO)		
	1.1 Contract set-up		2. Receive and process the handover information from the tender phase, includes contract, specifications, risk assessment, scope of work, legal documentation, warrants, etc. (NAO; PTD)		
			3. Develop the contract management plan with the contract management team (Elsey; NAO; PTD)		
			4. Assign clear roles and responsibilities within the contract management team (Elsey; NAO; PTD)		
			5. File all formal documentation in the information management system (PTD)		
			6. Set up a kick off meeting to discuss contract with contractor and other related parties (PTD) 7. Discuss the contract thoroughly with the parties until full comprehension is achieve: scope of work, monitoring measures, customer satisfaction, pending matters from tender phase. (PTD)		
	2.0 Roles and responsibilities		<p>Competences: Technical knowledge, goal oriented and effective communicative skills. Responsibilities: Monitor, ensure goal achieving. Awareness: constantly overview and evaluate risks, ensure value for money</p>		
		2.1.1 Document management system	8. Provide updated, accurate and consistent information to the related parties regarding the contract topics (Elsey; McPhee; OGC; PTD)		
			9. Develop and maintain a Document Management System (DMS) for managing information and providing a single source of truth (Elsey; McPhee; NAO; OGC; PTD)		
			10. Have an updated list of contact of the people from different parties (and the organisation) involved in the contract (McPhee)		
			11. Inform about relevant changes in the contract to the related parties (Elsey; McPhee; PTD)		
			12. Have a digitalized and hard copy of all formal documents in the DMS (NAO)		
			13. Identify, gather and record relevant updated information in the DMS (McPhee; OGC; PTD)		
			14. Elaborate performance reports based on information accrue by other members of the contract management team(OGC; PTD)		
		2.1.2 Performance records	15. Record underperformance events in writing with parties' acknowledgement (PTD)		
			16. Elaborate reports within the agreed periodicity, based on information accrue by other members of the contract management team (Elsey; NAO; PTD)		
		2.1.3 Periodic reports	17. Ensure periodic reports are complete according to contract terms and conditions but also fulfilled reflect information needed for the contract management team and other related parties. (Elsey; OGC)		
			18. Ensure periodic reports are supported with the correspondent attachments (Elsey; OGC; PTD)		
			a. Payment slips		
		b. Outstanding guarantees			
		c. Insurance in force			
		d. Progress schedule and cost control			
		e. Performance monitoring			
		f. Organisation's assets maintenance			
		g. Changes			
		h. Updated risk register			

Case Study N^o _____ Interviewee _____ Date _____

1. Timewise	2. Elements of the phase	3. Sub-elements of the phase	4. Guidelines	5. Recognition of the guideline being present in the current contract approach? Please indicate NO or If so, the phases where the guideline is recognizable (D:Design, B: Build, O: Operation, M: Maintenance)	6. If YES, indicate where is the evidence: a) Contract clause; b) Minutes of meeting; c) Common verbal agreement; d) Other (indicate)	
2 Contract management		2.1.4 Payments	19. Determine if the service provided comply with the service level agreed in the contract before processing the payment, with the help of performance reports (McPhee)			
			20. Follow the payment procedure according to the contract terms and conditions. (McPhee; NAO)			
			21. Payment processes and mechanisms are defined and in place (McPhee; NAO)			
			22. Incentive structures are based on desired outcomes, with appropriate approval procedures (NAO; OGC)			
			23. Avoid the organisation to fall into onerous commercial terms, such as price escalation or compulsory payments without added value (NAO)			
		2.1.5 Communication	24. Establish official media for communication with each party involve in the contract (McPhee)			
			25. Refer parties to the DMS when requesting information (McPhee)			
			26. Determine level of importance of which communication should be registered the DMS only and which should also be notify to the related parties. (McPhee)			
			2.2 Performance management	27. Create a Performance Management Plan including the following: Key Performance Indicators, service level agreements, frequency or periodicity of measurement, procedure for evaluation of results and contingency plan for underperformance. (McPhee; NAO)		
				2.2.1 Key Performance Indicators	28. Confirm the clearness and measurability of performance indicators with the contractor (Else; NAO; OGC; PTD)	
	29. Ensure the indicators are comprehensively understood for all parties and aligned with contract objectives (OGC; PTD)					
	30. Define realistic scales of performance for all indicators to provide a scale for establishing incentives to the contractor when over achieving standard level of performance. (McPhee; NAO; OGC; PTD)					
	31. Establish indicators to measure customer satisfaction(Else; NAO)					
	2.2.2 Monitoring, assessment and amendment of KPI's	32. Consider the value of the outcome of the measuring should be larger than the cost of measuring the indicator (Else; MCPhee; OGC)				
		33. Review periodically the monitoring outcome to detect possible underperformance (McPhee; PTD)				
34. Review periodically the efficacy of the measures, assess them and reconsider if necessary (McPhee; PTD)						
35. Ensure the value/cost ratio of the measures is increasing during the lifespan of the contract (Else; MCPhee; NAO; OGC)						
36. If sights of underperformance are detected, communicate with the correspondent parties to find a solution (McPhee)						
37. Provide feedback to the contractor regarding their performance (McPhee; NAO; PTD)						
2.2.3 Underperformance	38. Identify the underperformance's causes and consequences for the parties involved (McPhee; PTD)					
	39. Assess the severity of the underperformance, if low; informal communication with contractor should be enough, if severe; discuss with contract management team and contractor to revert situation and reduce magnitude of consequences (McPhee; PTD)					
	40. Inform stakeholders and related parties about the underperformance (PTD)					
	41. Part of the contingency plan is to consider the possibility of changing contractor (McPhee)					
2.3.1 Risk Register:	42. Use a risk register as a tool for risk management in case there non in the contract, otherwise continuously updated the risk register stated in the contract. (Else; MCPhee; NAO; PTD)					
	43. Identify risks (and opportunities), with cause and consequences, assign impact and probability values (Else; MCPhee; NAO; PTD)					

Case Study Nº _____ Interviewee _____ Date _____

1. Timewise	2. Elements of the phase	3. Sub-elements of the phase	4. Guidelines	5. Recognition of the guideline being present in the current contract approach? Please indicate NO or if so, the phases where the guideline is recognizable (D:Design, B: Build, O: Operation, M: Maintenance)	6. If YES, indicate where is the evidence: a) Contract clause; b) Minutes of meeting; c) Common verbal agreement; d) Other (indicate)
	2.3 Risk Management	Identification, mitigation and evaluation	44. Elaborate mitigation measures and contingency actions, consult suitable professional according to the risk nature (Elsey; McPhee; NAO; PTD)		
			45. Rank risks according to their value for further assessment (Elsey; NAO; PTD)		
		2.3.2 Assigning responsibilities	46. Contract management team is responsible for the risk bear by the organisation (Elsey; NAO; OGC)		
			47. Assign risks within the contract management team to the best suitable professional profile (Elsey; OGC)		
		2.3.3 Ongoing risk review	48. Involve the organisation hierarchy levels accordingly to the value of the risk (NAO)		
			49. Review and update the risk register periodically (Elsey; NAO; PTD)		
	2.4 Changes Management	2.4.1 Causes of variations	50. Reassign risks to the party best suitable to bear them in case of change of conditions		
			51. Develop Change Management Plan, with appropriate change/variation/dispute procedures in line within the organisation regulations (Elsey; McPhee; OGC; PTD)		
		2.4.2 Change management	52. Identify the reasons behind changes, claims of disputes (Elsey; McPhee; OGC)		
			53. For changes or claim unresolved with informal communication, escalate the appropriate management hierarchy (McPhee; OGC; PTD)		
			54. Strive for cooperative and trustworthy environment with contractor to ease negotiations(OGC)		
			55. Assess changes comprehensively, repercussions to parties and stakeholders (McPhee; PTD)		
			56. Follow the change's procedure from the change management plan (McPhee; PTD)		
		2.4.3 Legal claim avoidance	57. Communicate change's effects to the related stakeholders (McPhee; PTD)		
			58. Changes are made using contractual provisions and provide value for money (Elsey; NAO; OGC; PTD)		
	2.5 Relationship management	2.5.1 Stakeholder management	59. Negotiate claims through informal communication to avoid further legal procedures (McPhee)		
			60. Follow hierarchy escalation in the organisation management when solving a claim according to CMP (McPhee)		
			61. Consider further procedures to solve a claim involves mediation, arbitration and litigation (McPhee; OGC)		
			62. Encompass the contract management team with skills to start and positively develop long term relationships with stakeholder and parties inside and outside the contract (Elsey; McPhee; NAO; OGC)		
		2.5.2 Long-lasting relationships	63. Promote clear, open, frank and peer-to-peer communication with parties related to the contract (Elsey; NAO; OGC)		
			64. Ensure information transmitted is effective, understandable, on time and avoiding ambiguities (NAO; OGC)		
65. Strive for constant improvement of the relationships in all management levels (Elsey; McPhee; OGC)					
66. Guide proper escalations within organisation management hierarchy (Elsey; OGC)					
		67. Stimulate cooperative and collaborative approach instead of a duel approach in the relationship (McPhee; OGC)			
		68. Boost team work and benefit from knowing weaknesses and strengths of the other parties (Elsey; OGC)			
		69. Avoid resorting the contract terms and conditions every time to demand the contractor to fulfil its obligations (Elsey)			
		70. Assign in the contract management team a suitable professional in charge of relationship management (Elsey; McPhee; OGC)			
		71. Develop attitudes that promote an honest, trustworthy long term relationship (Elsey; McPhee; OGC)			
		72. Ensure communication roles and responsibilities of the team involved in the parties (McPhee; NAO; OGC)			

Case Study N^o _____ Interviewee _____ Date _____

1. Timewise	2. Elements of the phase	3. Sub-elements of the phase	4. Guidelines	5. Recognition of the guideline being present in the current contract approach? Please indicate NO or If so, the phases where the guideline is recognizable (D:Design, B: Build, O: Operation, M: Maintenance)	6. If YES, indicate where is the evidence: a) Contract clause; b) Minutes of meeting; c) Common verbal agreement; d) Other (indicate)
			73. Communicate clearly and straightforward the organisation's service expectation to the contractor to avoid future frustrations (NAO; OGC)		
3 Contract closure	3.0 Roles and responsibilities		Competences: clerical, detail oriented Responsibilities: Highly administrative, ensure goal achieving Awareness: ensure obligations are fulfilled		
	3.1 General Contract Closure		74. Ensure all obligations and responsibilities are fulfilled by all parties to set a clear termination of the contract (PTD) (McPhee)		
			75. Evaluate fulfilments of contract goal and main objective (McPhee; PTD)		
			76. Confirm all payments and financial closure (McPhee; PTD)		
			77. Assess customer satisfaction during the contract lifespan (PTD)		
			78. Release warrants and insurance with the suppliers accordingly (McPhee; PTD)		
			79. Proceed with the administrative closure (McPhee)		
			80. Assert all materials and borrow equipment have been returned to the correspondent supplier/contractor (McPhee; PTD)		
	3.2 Premature contract termination		81. Terminate all access into the project to the contractor and other parties (McPhee; PTD)		
			82. Ensure smooth transition between new and current contractor: (Elsej; MCPhee; NAO)		
			a. Service is being delivered up to the standards uninterrupted		
			b. Customer satisfaction levels are constant		
	3.3 Contract extension		83. If possible, allow the new and old contractor to work simultaneously and transfer of information takes place (McPhee; NAO)		
			84. Reduce risk of falling into service unavailability (McPhee; NAO)		
			85. Be aware of key dates to dispose enough time arrange contract extension (McPhee; NAO)		
	3.4 Contractor performance evaluation		86. Assess current contractor in regard to performance (McPhee)		
			87. Evaluate the value/cost ratio between extending a contract to current contractor and a new procurement process within the market (McPhee)		
			88. Execute and analyse the contractor performance in regards to contract terms and conditions (McPhee; PTD)		
	3.5 Lessons learned		89. Evaluate relationship with contractor during contract lifespan (PTD)		
			90. Discuss contractor performance evaluation with management level of the organisation to finalise evaluation (McPhee; PTD)		
			91. Register evaluation accordingly in the organisation's files		
		92. Record and file lessons learned as they occur during the contract lifespan (McPhee; PTD)			
		93. Discuss lessons learned with contract management team, and with the related party involved (stakeholders, contractor, etc) (PTD) (McPhee)			