Project management maturity of the Dutch Water Boards

An exploratory research in maturity models

Floris Paul Alta

Balance
Advies + Projecten + Interim

TU Delft

Colophon

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Author:

Name:	Floris Paul Alta
Date of birth:	18-02-1987
Student number:	1363816
Telephone number	
Email:	

Study program

University:	Delft University of Technology
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Graduation Committee

Chairman:	Prof. dr. Hans L.M. Bakker Faculty of Civil Engineering, TU-Delft
Committee supervisor:	Dr. ir. Marian.G.C. Bosch-Rekveldt Faculty of Civil Engineering, TU-Delft
Committee supervisor:	Dr.ir. Louis H.M.J. Lousberg Faculty of Real Estate and Housing, TU-Delft
Company supervisor:	Mr. Marco Buijnsters Balance

Company:
Balance
Westerlaan 20A
3016 CK Rotterdam

University:
Delft University of Technology
Mekelweg 2
2628 CD Delft

Preface

As a Master Student Construction Management and Engineering at the University of Delft I wrote this master thesis in collaboration with Balance, a company specialized and consulting in project management, on organisational maturity in order to help further professionalise project management capabilities of the Dutch Water Board and to give an indication of what project management maturity for the Water Boards entails.

First I would like to thank my Graduation Committee. I would like to thank Hans Bakker for his sharp and useful comments on the overall model indicators. This gave me new insights for the adaption of the scope of the thesis. I am very grateful to Marian Bosch-Rekveldt for giving sharp to the point and substantive comments on my work, that brought my research further. I would like to thank Louis Lousberg for giving advice to make certain choices in the thesis and still maintaining scientific relevance as well. Also, I would like to thank Marco Buijnsters sharing his practical experience of the Water Boards and insights that helped me further in the process.

I would like to thank both my parents for the endless support. Than I am very grateful to my friend Lotte who gave me to the point advice during the process with her sharp and scientific insights. I would also like to thank Lukas for all the proofreading. Much obliged! Lastly, I would like to thank my friends and family for their continued patience and support.

Enjoy reading!

Floris Alta

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Executive summary

Introduction

Project management is constantly changing and the organisations put effort in increasing their project management capabilities. The Dutch Water Boards are the second most important public principal in water infrastructures. One of the Water Boards had concluded that they wanted to further professionalise the project management organisations. But, it is difficult for an organisation to know how to improve. Maturity models are a way in indicating the project management capabilities of an organisation and show a path for improvement. However, the problem indicated in this research is that *there is no general clear indication of what makes a project management organisation mature.* The research objective for this research is to get *an indication of the state of maturity of the Dutch Water Boards.*

In order to meet the research objective, the main research question is formulated:

"What is the state of maturity of the project management organisation of the Dutch Water Boards?"

To answer the main research question the following three sub-questions formulated:

1. *"What are the important factors to include in the Project Management Maturity Model and to test the Project management organisation of the Water Board, in order to measure their maturity?"*
2. *"What makes the organisation of the Dutch Water Boards mature in project management?"*
3. *"What is the determined maturity level of the tested Water Boards in this thesis?"*

These sub-questions will contribute to the main-question and in their turn, meet the objective of this research. For this research, theory will be gathered on different project management increasing initiatives and maturity models to be able to answer the first question. With gained theory and a preliminary research, a model will be made to answer the second sub-research question. This model is then used to test two different Water Board organisations on different Maturity Perspectives. The results will be subjected to single and cross-case analyses and will conclude to a sole answer for the third sub-question.

Theoretical framework & preliminary research

Project management is "*the management of projects is an application of methods, tools, techniques and competences to project activities to meet project requirements*" (PMI, 2013, p. 1). In order to improve the capabilities of an organisation, there are many theories in how this can be approached. Fernandes et al. (2015) mentioned different project management increasing initiatives substantiated by many articles and the author categorized them into four parts:

- *Processes, tools and techniques,* that appoints the importance of standardised processes, tools and techniques inside the organisation.
- *People and organisational learning,* circumscribes the importance of having competent people inside the organisation and being aware of their capabilities. But also play a role in training them inside the organisation.
- *General management systems,* stresses the importance of having similar systems inside the organisation to facilitate project management.
- *Culture* is the understanding of project management and creating awareness amongst personnel that project value is important.

However, it is hard for an organisation to know where to improve in (Cooke-Davies, A., 2003) and the selection of fields of improvements depends on environment, structure of organisation, skills and background of the project manager and team members (Westerveld, 2003). Maturity models are a manner of showing the organisations project management capabilities and in giving directions for improvement. However, *"the field of project management maturity modelling is labelled as 'semantic minefield"* (Cooke-Davies, 2004, p. 211). Plus, there is no general accepted maturity model and they do not take the project organisation's context into account. Three selected models have been used as reference to build a maturity model. To get a better grip on the contextual factors the water board organisation has been explored with a preliminary interview. This indicated that project management and maturity could be improved by creating a maturity model that takes the context of an organisation into account and tests it on proven different project management capabilities.

The first model

The test of the different Maturity Perspectives, that have been mentioned by Fernandes et al. (2015) are needed to be able to improve project management and are also reoccurring topics in the three reference models. The model categorizes the different Maturity Perspectives by means of a five level system similar to many maturity models, in order to measure and benchmark results of the different projects inside the Water Boards. HWBP projects and regular projects are tested on the basis of common maturity techniques of interviews, self-tests and supporting documents. These results will be put against Indicators that define each of the level scores of KPI and Maturity Perspectives.

Conclusion of analyses & model review

For this case study two Water Boards have been tested. Single case and cross-case analyses have indicated that both the organisations are on level 2 on the tested Maturity Perspectives. This is not the only conclusion of the analyses. It was demonstrated that there are large differences between the project management organisation of HWBP and of their regular projects. HWBP projects are seen as exemplary for project management improvement and it has been shown that project management development inside the organisation has influences on other levels of the organisation. The model has to be adapted with the new gained insights and the created model is more applicable to the context of the Water Board organisations. With the new insights, the maturity for the Water Board is defined: *"The degree in which the Water Board is able to create interrelation of the organisation with project management, to allow changing structures aimed to improve project management."*

Water Board Project Management Maturity Model & Maturity level indication

The conclusion of analyses resulted in the adapted model, as can be seen in simplified illustration in Figure 1. The large difference between the first and this model, is that it includes the interrelation of the Water Board organisation as means, in order to determine maturity.

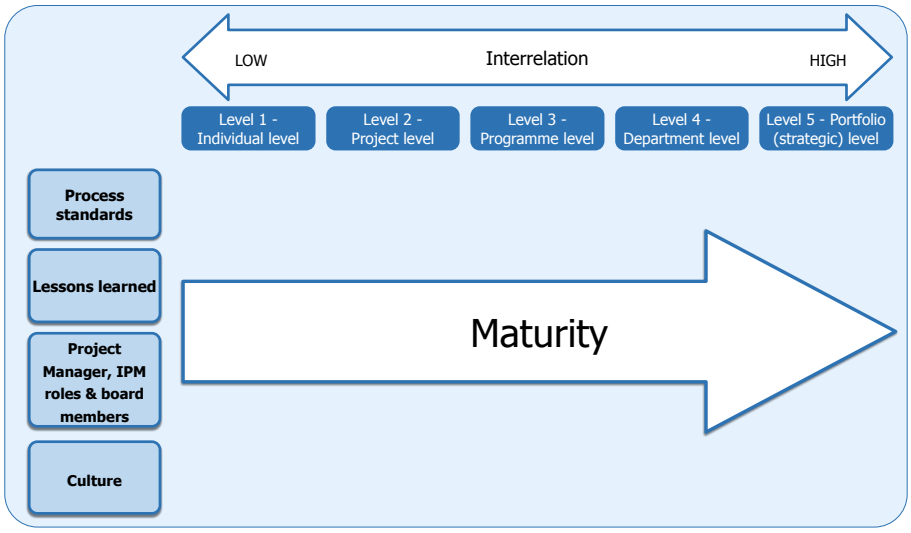

Figure 1: Illustration of the Water Board Project Management Maturity Model

The results of the case studies were reassessed and the level indication resulted a score of Level 2 – Project level, of both Water Boards.

Conclusion

With the gained answers of all of the sub-question contributed to the answer to the main research question:

"What is the state of maturity of the project management organisation of the Dutch Water Boards?"

To be in the state of fully being able to implement HWBP and other project management improvements, the organisations need to be capable in coordinating and aligning their structures. Since this is not the case, the state of maturity of both Water Boards is seen as not mature yet.

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Glossary

Abbreviations	Meaning
HWBP	Hoogwaterbeschermingsprogramma
KPI	Key Performance Indicator
PI	Performance Indicator
I	Indicator
RvdR	Ruimte voor de Rivier
RWS	Rijkswaterstaat
WB A	Water Board A
WB B	Water Board B

1 Introduction

The Dutch are famous for their control of water and the way the works are being designed and implemented. These works are not only impressive to look at, but they are also a vital part of maintaining safety for nine million inhabitants that are living below sea-level. Due to the fact that a large part of the Netherlands is situated at that level, it has always been a large undertaking in retaining this safety (Brouwer, 2015). In addition, external factors of climate change, depreciated dikes in the river area, soil subsidence, and new European norms, make projects increasingly complex (Rijkswaterstaat, 2014)

There are two large public organisations involved in the management of water control in the Netherlands. Rijkswaterstaat (RWS), formed in the 19th century, is responsible for the total control of the main waters i.e. sea and rivers. The second public organisation is the cluster of twenty-three regional Water Board organisations. Each of them is responsible for management of regional fresh water systems and smaller waters (Rijksoverheid, 2015). The Water Boards have one billion euro per year to spend on new constructions and maintenance of small waters, making them, after RWS, the second most important principal of the Netherlands water infrastructure sector (UWV, 2014)

Water Boards have complex portfolios: They consist of self-initiated internal programmes and projects, and also programmes that are part of national programmes such as *Ruimte voor de Rivieren (RvdR)* or *Hoogwaterbeschermingsprogramma* (*HWBP).* The climate change and increasing complexity of portfolios stimulate the Water Boards to further professionalise their project management capabilities in the organisation.

A representative of one of the Water Boards has asked the company Balance to give insight into the status of the project management in their organisation to help them further professionalise it. It was also indicated that there is a need for comparability of the status of the project management between different the Water Boards to learn from each other.

A project management maturity model is a way to give insight in the status of the organisation to help it to further improve project management (Backlund, Chronéer, & Sundqvist, 2014; Man, 2007)) and also have a clear structure that allows for benchmarking of different organisations (Man, 2007). However, project management maturity models are too inflexible in their current status to be of service for an organisation (Mullaly, Pasian, & Williams, 2014) and do not take the organisation's context into account (Van Looy, Backer, & Poels, 2011). To make a project management maturity model relevant it should include the broader contextual and organisational factors in which the projects are managed (Mullaly et al., 2014).

This exploratory research contributes in indicating the state of maturity of the Dutch Water Boards, by building a model specifically for the Water Boards to test their maturity status.

1.1 Problem description

Project management maturity models serve as frameworks to assess the competences of the organisation and recommend a plan of action, mostly in a step-like structure, that result in the improvement of the project management in the organisation (Christoph & Konrad, 2014). However, there is no universal agreement on practises and Cooke-Davies (2004) indicates in his study that *"the field of project management maturity modelling is labelled as 'semantic minefield'"* (Cooke-Davies, 2004, p. 211*)*. Most models propose a certain practice and are seen as important for all organisations, without including the organisations own practices or context (Kwak, 2015), and according to Mulally et al (2014) resulting in inflexibility. This makes it challenging to get an indication of project management maturity for the Water Board with the available general project management maturity models. Forming the following problem statement:

> *"There is no general project management maturity model that can give the Water Board organisations an accurate indication of their state of maturity."*

1.2 Research scope

This research is focused on project management of the Water Boards. Before continuing further in the explanation of the research, the boundaries of this research are defined to create enough specificity. This guides the structure of this research and helps to understand the objective of this research.

The research of this thesis is focussed on project management inside the Water Board organisation. Project management is *"the management of projects is an application of methods, tools, techniques and competences to project activities to meet project requirements."* (PMI, 2013, p. 1). In which, a project is a *"unique, temporary, multidisciplinary and organised endeavour to realise agreed deliverables within pre-defined requirements and constraints"* (IPMA, 2015, p. 27). Project management and its interfaces in the organisation will be further explained in paragraph 2.1.

This exploratory research is finding a solution for the Dutch Water Boards and conducted at two of the twenty-three Water Boards. Water Board A and B, referred in this thesis as WB A and WB B. The division of Water Boards can be seen in Figure 2.

The organisation, governance, processes and the different types of projects of one of the Water Boards is further described in Chapter 3, to give a better situational understanding.

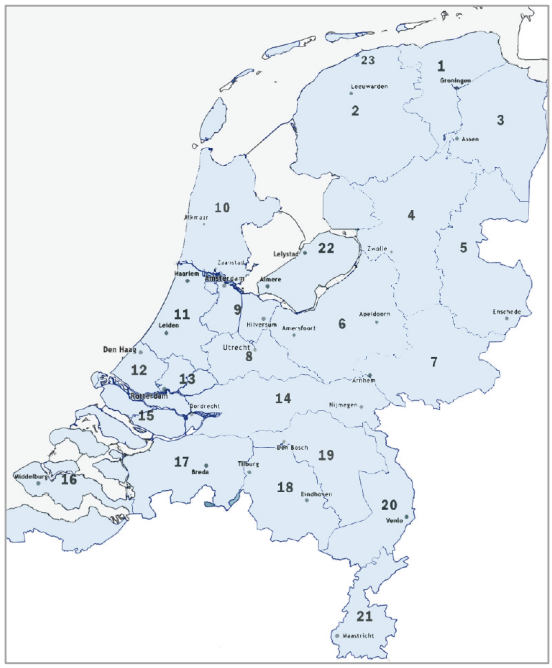

Figure 2: An adapted illustration of the Water Boards in the Netherlands of van Aalst (2015)

1.3 Research objective

The focus of this research is aimed in giving the tested Water Boards an indication of maturity status. To give such an indication, a project management maturity model is built for the Water Boards. This not only allows an exact measurement of the organisation's project management maturity status, but also to compare it to defined references levels and to be able to get an indication of their own status. Creating the following research objective:

> *The research objective is to get an indication of the state of maturity of the Dutch Water Boards*

1.4 Research questions

The research objective translates into the following main research question:

> *"What is the state of maturity of the project management organisation of the Dutch Water Boards?"*

In order to provide answer to the main research question, different insights are required and knowledge needs to be gathered. For this reason, the main research question is being split up in three sub-questions. These will be answered throughout the thesis. The total of the three sub-questions will provide an answer to the main research question.

For the first research question it is important to know the factors that test maturity and to understand the context of the Water Boards, in order to form a model to be able to test its status. Forming the first sub-question:

1. *"What are the important factors to include in the Project Management Maturity Model and to test the Project management organisation of the Water Board, in order to measure their maturity?"*

To test the state of maturity an indication is needed of what maturity is for the Water Boards, due to the fact that there is no clear indication of maturity (T. Cooke-Davies, J., 2004). Resulting in the second sub-question:

2. *"What makes the organisation of the Dutch Water Boards mature in project management?"*

Before answering the main research question, an indication of the level of maturity is needed in order to answer it. Forming the last sub-question:

3. *"What is the determined maturity level of the tested Water Boards in this thesis?"*

1.5 Research structure

In order to answer the main research question, it is required to build a specific project management maturity model for the Water Board. This model should include the contextual and organisational factors in order to give an indication of its maturity status. Differentiating it from the general maturity models that project their uniform practices and specified processes that are not universal, on the situation of the organisation (Jugdev & Thomas, 2002). To get a thorough understanding of the context of the Water Board organisation, the model is built in three parts to indicate that state of maturity of the Water Boards in the fourth part. Each of the first three parts will also give an answer to the sub-question, helping to find answer to the main research question. A simplified illustration of the structure is given in Figure 3 and will be further explained.

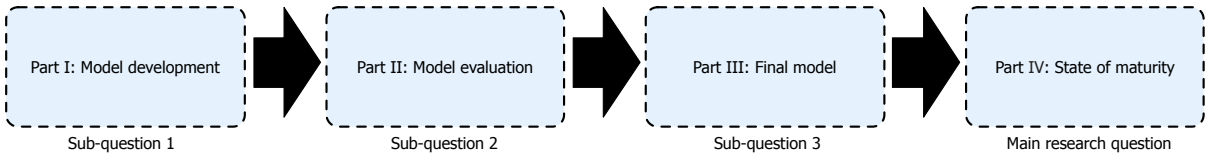

Figure 3: Research structure

In the first part factors are indicated that are relevant to test maturity on and are included in the first model. In the second part the model is tested, indicating the maturity levels of the water board for the first time, to test its function and whether the factors were in fact of relevance. This phase should also indicate what maturity means for the tested Water Boards. In the third part the final model is introduced and the water board maturity is tested again to come to the conclusion in Part IV.

1.6 Research design

The research structure resulted in the setup of the research design. Further detail of the research and the chapter build-up of this thesis will be explained. The research design is illustrated in Figure 4.

In Part I: Model Development, is divided into three chapters. In Chapter 2, the different project management increasing initiatives are being explored to put against the different maturity increasing factors in maturity models. It also further discusses the project management maturity model concept and the publications about them. The chapter ends with three selected project management maturity models that are further explored. Chapter 3, provides a better understanding of the project management organisation of one of the Water Boards. The input for this chapter is obtained from a preliminary interview and background information gathered about the projects, organisation construct and processes. This is to get a better understanding of the context of project management organisation, to use in the maturity model. With the evaluated information of both chapters a first model will be built in Chapter 4 and it will answer the first sub-question: *"What are the important factors to include in the Project Management Maturity Model and to test the Project management organisation of the Water Board, in order to measure their maturity?"*

In Part II: Model evaluation, two case studies are being conducted at two Water Boards and summarised in Chapter 5. It is a qualitative research approach to get a holistic representation of the organisation. The case study contains semi-open questions and document analyses. At each of the Water Boards four interviews have taken place. This is done, next to testing the criteria of the model itself, to increase internal validity of what is being tested. The two separate case studies have an

identical setup, to be able to find possible correlations that can be deducted from the data in a similar setup. The knowledge gained from looking at the cases separately, will be used to compare the case studies in Chapter 6. It will also indicate the position of the Water Boards in relation to each other. During this process, it will give a higher abstraction level and increases validity due to research triangulation (Verschuren & Doorewaard, 2007).

The part ends with Chapter 7. This helps in adjusting the model's reference framework and shows what project management maturity means in both Water Board organisations. Answering the second sub-question: *"What makes the organisation of the Dutch Water Boards mature in project management?".* Information abstracted from the analysis will be used in adapting the model in the next part.

Part III: Final model, starts with chapter 8 explaining the adjusted model and will be used to test the maturity status of both the Water Board organisations in Chapter 9. All the case studies and results of the first model will be analysed, to use in the final model. Giving the maturity level indication and answering the third and final sub-question: *What is the determined maturity level of the tested Water Boards in this thesis?*

Part IV: State of maturity, contains Chapter 10 in which the answer will be given to the main research question: *"What is the state of maturity of the project management organisation of the Dutch Water Boards?".* The part also contains recommendations for maturity improvement in Chapter 11 and ends with Chapter 12, wherein a reflection, limitations and advice for further research is discussed.

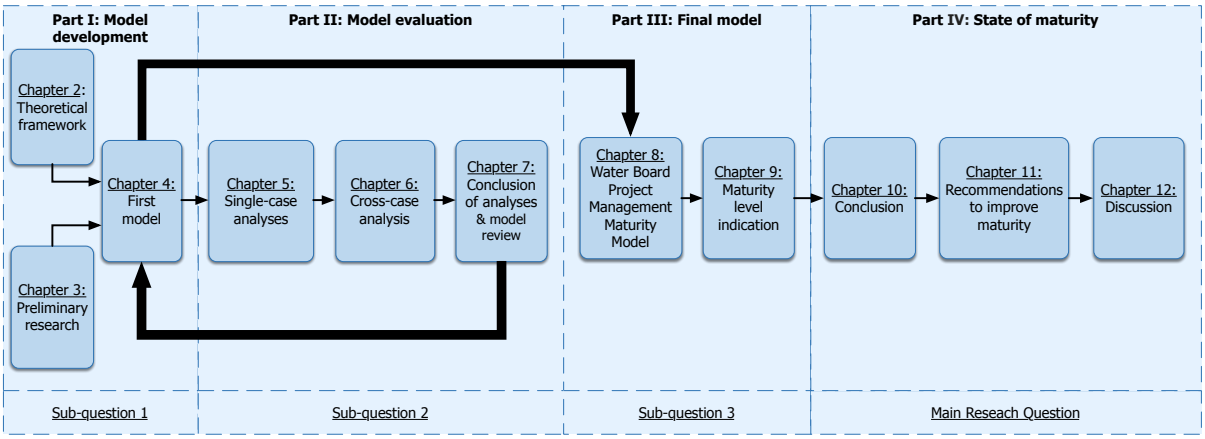

Figure 4: Research design

PART I / MODEL DEVELOPMENT

2 Theoretical framework

The first paragraph explains the basic principal of project management and the second paragraph explains factors that contribute to increase project and project management success. A way of indicating which factors are important to further increase the change of success for a project management orientated organisation are maturity models (Shi, 2011). They will be discussed in detail in the third paragraph of this chapter. This paragraph describes the history, the basic framework and the publications about the models in literature. Further, a selection of the maturity models is given, from which three models will be selected that satisfy set criteria. These three will be analysed and discussed in detail.

2.1 Introduction in project management

Project management has developed into a separate discipline, next to management in other subject fields, e.g., finance, information technology (Mir & Pinnington, 2014). It has been developed substantially as discipline, increasing in importance and visibility (Fernandes et al., 2015). Businesses have become more project orientated (Martinsuo, Hensman, Artto, Kujala, & Jaafari, 2006) and their projects have become the way to motivate and integrate organisational functions to higher levels of performance (Morris, 1997). The quality and knowledge of this subject has been substantially improved over the years since the 1970, due to increasing publications research articles and the wider arrange of rigorous methodologies for project management (Turner, 2010) and is exposed to continuous development. Nowadays there are different standards that are created by the Project Management Institute (PMI), International Project Management Association (IPMA) and International Organisation for Standardization (ISO) showing ways in structuring and guiding project management in how it should be managed.

Traditionally, project management has five stages or phases that are commonly used to control projects in: initiation, planning, execution, controlling and closing (Zandhuis, 2013). Along these stages, the projects are controlled according to project constraints. Project management started in balancing projects in the constraints of time, costs and scope, also known as the iron triangle as shown in Figure 4. However, due to the increasing complex nature of projects and development thereof, project management has been expanded into more constraints. ISO 21500 for example divides constraints into ten subject groups of *integration, stakeholders, scope resource, time, cost, risk, quality, procurement, and communication (Zandhuis, 2013, p. 73)*. The use of subject groups in the stages differ per project, depending on the context in which the project is developed in. Subject groups are further being referred in the paper as knowledge areas.

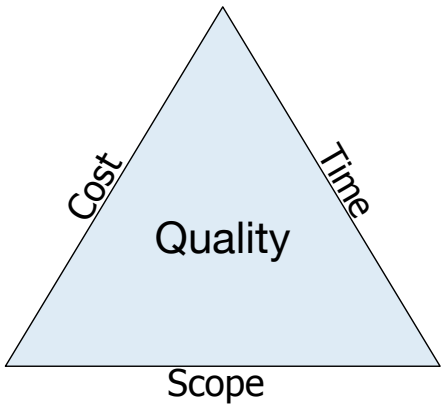

Figure 5: Iron triangle

Projects can be managed individually or in the scope of programmes and portfolios. Programme management is a group of similar projects orientated towards a specific goal (Bakker & Kleijn, 2014). Management of a portfolio is "*A collection of projects, programmes, sub portfolios, and operations managed as a group to achieve strategic objectives*" (PMI, 2013, p. 9). With the important notion that both should not be confused with each other according to Turner (2014, p. 81) "*Programmes have common outputs and portfolios have common inputs*". A portfolio can contain several different programmes and projects with the goal of achieving strategic business objectives of an organisation (Bakker & Kleijn, 2014). Organisations can have different programmes, projects and portfolios, independent from each other, as illustrated in Figure 5.

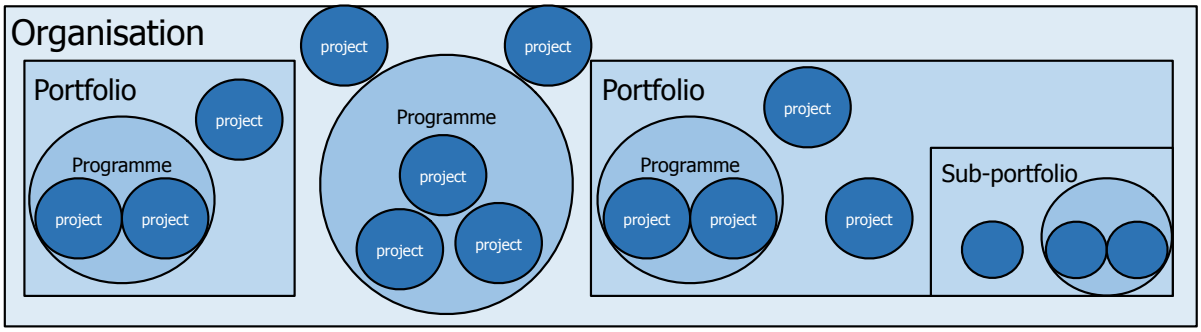

Figure 6: Projects, programmes and portfolios in an organisation

There are three groups that are affected by projects according to ISO 21500. They can be divided into: project organisation, project governance and other stakeholders. The arrangement is illustrated in Figure 6. The project organisation is composed of a project manager that is responsible for successful project completion, a project management team that supports the project manager, and a project team that performs the actual project work. The project governance group is controlling and directing the projects from an organisational point of view, making sure that there is a proper environment established in which to execute the projects. They authorize and oversee the portfolio, programmes, and projects through their framework and principals. Project governance has a project sponsor that represents the organisation, which owns and funds the projects, a project steering committee that consists of project manager, senior managers that steer the projects from a business case and organisational strategy perspective, and a project management office or PMO that has a supporting role in project management practice and execution (Zandhuis, 2013).

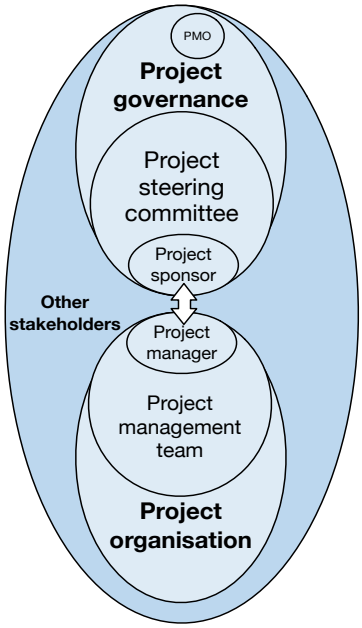

Figure 7: Stakeholder groups based on an illustration of (Zandhuis, 2013)

The organisational structure and culture have influence on the project processes and organisation of teams for a project (IPMA, 2016, p. 23): "*Project-oriented governance consequently includes those areas of governance that are specially related to project, programme and portfolio management activities, e.g. definition of policies and management standards, selection of processes, methodologies and tools as well as structures for reporting and decision-making.*" The external stakeholders are e.g. contractors, customers and employees and are standing outside the organisation. The ways in which they are involved in the projects, differ greatly from each other (Zandhuis, 2013).

Next to processes, standards, methodologies and tools and organisational structure, it is the people that deliver the projects. For example, the project management and successful completion of it, depends substantially on the competence of leadership, emotional intelligence, intellect and management focus of a project manager according to Turner and Muller (2007).

2.2 Improving project management of an organisation

According to (Cooke-Davies, 2003) for organisations or businesses that are project based, such as in construction industries, success in projects directly translates to organisational success. Nonetheless, achieving project management success and project success, remains a challenge for many organisations.

There is a difference in project management success and project success. Project management success is often focussed on the objectives of time, costs and quality. Project success goes beyond that of project management success (Albrecht & Spang, 2011). The aspects of what makes projects successful is an often debated topic in literature and is still not generally agreed upon (Joslin & Müller, 2015). Success strongly depends on the specific project context and is seen as a multidimensional concept (Albrecht & Spang, 2011), with short-term project success focussing on *efficiency, meeting internal project requirements,* and long-term focussing on achievement of results of the project *effectiveness and impact* (Joslin & Müller, 2015, p. 1378). However, in project management literature there is wide consensus about the two components to create project success i.e., success criteria and success factors. Success criteria are the indicators we use to evaluate the successful outcome of a project and forming the dependent variables in which project success is measured. Project success factors are elements of a project that have influence on the likelihood of success (Jugdev & Müller, 2005). They are "*characteristics, conditions, or variables that can have a significant impact on the success of the project when properly sustained, maintained, or managed*" (Papke-Shields, Beise, & Quan, 2010, p. 183). Project success criteria differ per perspective, project size, type and complexity, making it unlikely that a general set of success criteria will be agreed upon (Mir & Pinnington, 2014). De Witt (1988) concludes in his article that a project can be success for one and a disaster for the other. *"Therefore, to think that one can objectively measure success of a project is an illusion"* (De Wit, 1988, p. 169).

Categorisation of success factors is an issue as well. Fortune (2006) listed critical success factors for project management that were identified across 63 publications, obtained from case studies and surveys. The article of Fortune (2006) is one example and there are many other articles that publish wide varieties of success factors, which makes it hard to steer a project management organisation in a structured way to improvements (Mir & Pinnington, 2014).

Fernandes et al. (2015) attempted to increase the chance on project success by categorizing a list of Project Management Improvement Initiatives (PMII) based on empirical works that need to be implemented. In his work he classified the initiatives in themes (Fernandes et al., 2015, pp1055, 1056):

1. Processes, tools and techniques;
2. People and organisational learning;
3. General management systems;
4. Project management culture.

The initiatives in the first theme are focussed on the need of implementing the project management standards, methodologies, tools and techniques that offer guidance in project management. The implementation of them varies considerably per organisation (Mullaly, 2006). The organisation governance plays an important part in positioning the project methodologies. They decide on the level of comprehensive use in the organisation and its projects. Furthermore, it influences the way methodologies will evolve in the organisation (Joslin & Müller, 2015).

The second theme incorporates the management of competences of employees. The competences of people should be known in order to place them amongst teams effectively. Yazici (2009) addresses in his research that researchers have stated that there is a tentative correlation between personality fit in the projects and the chance of success. For example, Turner and Muller (2005) show in their study that the personality and leadership can make the manager more competent, thus influencing the chance on success. In this theme Fernandes et al. (2015) also elaborates on the training people should have in a 'culture of learning' inside the organisation in order to enhance the knowledge of project management inside the organisation. Different strategies are spread amongst organisations to train the employees and influence the success of projects.

The third theme discloses the importance of integrating the project management system within the organisation. In this way the project management activities can be aligned with the activities of the organisation. Wherein the strategic plan of the organisation should be tightly connected to the project identification and prioritization. Also, the organisation should have enough supporting infrastructure such as a project management office and to empower the project manager inside the organisation to manage projects to full capacity where respect and acknowledgment are important (Fernandes et al., 2015).

For the mentioned project management tools, techniques and methodologies, there should be a categorisation system, enabling to tailor them to the project context. Another topic in this theme is that during the project lifetime, projects should be benchmarked and performance of processes and people assessed. That enables feedback to the project management team and is put against theory to be able to improve project management capabilities continuously.

The last theme in the article is about the importance of creating awareness of project value, basic understanding of project management practices and establishment of project management practices as internal standards.

Fernandes et al. (2015) states that the way the project management implementation initiatives work strongly depends on the embedding factors that the organisation has.

Success factors can also be divided and categorized in long or short term according to Joslin (2015). Cooke-Davies (2002) discuss three areas for an organisation that are generally hard to make significant progress in, however they appear to be critical for long-term project success. One area is that the organisation needs to have portfolio- and program management practices to "*allow the enterprise to resource fully a suite of projects that are thoughtfully and dynamically matched to the corporate strategy and business objectives"* (Cooke-Davies, 2002, p. 188). Second area, is to provide project feedback and anticipate future success, to enable alignment of organisation decisions. Setting comprehensive metrics to measure project success and project performance is important too. The third area described, stipulates the importance of the learning experience in projects, in such a way that the people are encouraged to learn and to implement the experiences into project management processes and practices.

With all the categorizations, it should be kept in mind that, there are not many studies in critical success factors that focus on the contribution of human factors (Hornstein, 2015). According to Cooke-Davies (2002) it is not project management processes, standards and methodologies that are in place or the culture of the organisation that delivers projects, it is the people (Cooke-Davies, 2002). Having processes and methodologies in an organisation does not increase the chance for success, as it depends for a large part on leadership of the project manager (van Aken, 2009). Also one project can be closed successfully and the other not, in spite of having similar project management methods (Cserháti & Szabó, 2014). Managing people in the right way has influence on many results of the project (Belout & Gauvreau, 2004) and there is a "*changing bias from tools and techniques, toward the social and behavioural aspects of the management of projects"* (Leybourne, 2007, p. 61). Projects success depends for a fair amount on fruitful collaboration of all parties involved. Project practices like timely involvement of different parties e.g., contractors, maintenance and external stakeholders increases the likelihood of success (Bakker & Kleijn, 2014).

Westerveld (2003) believes that choosing success factors depend on the context of external environment, structure of organisation, skills and background of the project manager and team members, but this is different for each project as well. It depends on the size, uniqueness and its complexity.

In summary, there are many critical success factors for project management and selection is dependent on focus of short- or long-term (Joslin & Müller, 2015), project type, external factors, organisation (Westerveld, 2003) and embedding factors (Fernandes et al, 2015).

Consequently, for an organisation it is hard to create focus for improvement in project management. Project management maturity models aim to understand the current organisations project management capabilities and support in improving the project management practice in a structured manner (Fernandes et al., 2015). There are no project management maturity models that have reached general acceptance yet. However, there are many industries that use maturity models in organisations to increase their project management capabilities (Cooke-Davies, 2002).

2.3 Maturity models

With the use of maturity models, the organisations are able to test and indicate the project management capabilities on a tactical level and on a strategic level (Shi, 2011). This paragraph discusses the concept, the general structure and criticism in literature. Next, a study is done in selecting different maturity models along a set of selecting criteria. From here, three maturity models are studied to get an indication what the qualities, differences and similarities are forming the basis for the creation of an own model applicable for a Water Board organisation.

In literature, in the context of an organisation, the term maturity means that the state of the organisation is in the perfect condition to reach its business objectives (Andersen & Jessen, 2003). Khoshgoftar and Osman (2009, p. 298) define maturity as: *"a specific process of explicitly defining, managing, measuring and controlling the evolutionary growth of an entity."* Maturity in the context of projects would mean that an organisation is in the perfect condition to deal with its projects (Andersen & Jessen, 2003).

Maturity models are created by practitioners and institutes to measure processes embodied in a certain level of the organisation that they need to possess to be able to meet requirements of a certain level of professionalism. The grow phases give an indication on how an 'ad-hoc' organisation can grow into a professional self-learning organisation. The philosophy behind maturity models is that quality of a product can be reached by optimization of processes. Maturity models were created to maintain organisational competitive advantages in the market, cut costs and increase efficiency and time (Backlund et al., 2014). Maturity models reveal weaknesses and strengths (Khoshgoftar & Osman, 2009). It is a tool to *"provide a focus on an organisation and its ability to implement strategy through projects"* (Brookes & Clark, 2009, p. 52) and *"organisations' knowledge and experience can be translated into procedures, roadmaps, routines and databases, which leads to the configuration of a 'collective brain"* (Carvalho, Patah, & Souza Bido, 2015).

The concept of maturity models originates from Quality Management. Quality management has two technical processes: reduction in the variability inherent to the process, and improvements in main performance of the process (Cooke-Davies, 2003). It originates, according to von Scheel, from Richard L. Nolan's published 'stages of growth' model for IT organisations in 1973. The conceptualization became popular with the creation, from the Software Engineering Institute Capability Maturity Models by the Carnegie Mellon University from 1987 till 1993, of the Carnegie Mellon maturity model or CMMI (Pöppelbuß & Röglinger, 2011). This model was used for software related processes. The main steps of evolution in maturity models can be seen in the table 1.

Evolution Step	Time Period	Outstanding Approaches
Preliminary efforts for developing a structured method for quality management and improvement in organizations	1930–1980	Statistical Quality Control, TQM
Maturity concept evolved in software engineering field	Early 1980s	Maturity framework
Holistic approaches developed for identifying software improvement areas	1985–1995	SEI's capability maturity models
Maturity and excellence concepts adopted beyond software engineering field into project and business management processes	1990–1996	EFQM excellence model, IPMA's project excellence model, The Berkeley project management process maturity model
Integrated approaches developed for software development processes	1996–1999	Integrated capability maturity model
Excellence and maturity models adopted in project management field Comprehensive models developed for organizational-wide improvements in project-driven organizations	2000–Present	IPMA competency baseline, Project management competency development framework, PM Solutions' project portfolio management maturity model, OPM3

Table 1: Maturity model history (Kwak, 2015)

Since the 1990's Project Management Maturity Models emerged and currently there are over thirty Project management maturity models existing, that the majority of them have been created by project management consultancy firms (Albrecht & Spang, 2011). All project management maturity models are intended to drive a project management organisation strategically towards continues improvement in giving an indication of where they are now and where they are heading in the future. Part of this process is to compare the companies against best practices, bodies of knowledge and standards. On which maturity models generally are mostly based on (Albrecht & Spang, 2011; Grant & Pennypacker, 2006). Maturity of an organisation does not have to imply the entire company, but can also refer to a function, group, business unit or department (Man, 2007) Most models are based on the assumption that if one process in project management is not mature enough, it will affect the project as a whole (Man, 2007).

Project management maturity models that have emerged in research literature over the past decades are gaining interest, because academics and practitioners are searching for answers why some of the projects succeed and some not (Jugdev & Thomas, 2002).

2.3.1 General project management maturity model characteristics

A project management maturity model provides a framework to measure the project management competences. The higher maturity level the organisation reaches, the higher chance an organisation has in completing a project successfully according to Christoph and Konrad (2014). That being said, maturity models that have been developed over time, provides various ways to reach maturity. However, the majority of the project management maturity models are process driven and have a stepwise structure of five levels, originally introduced in the staged IT progression of organisations (Nolan, 1973). This structure is being seen by academics and practitioners as useful and is used in many maturity models ever since (Pöppelbuß & Röglinger, 2011).

The assessment of a maturity model is separated into as-is status (descriptive) and a detailed course of action plan to get to higher maturity level (prescriptive), but can also have a comparative stage which allows for internal and external benchmarking (De Bruin, Freeze, Kaulkarni, & Rosemann, 2005).

Organisations do not reach a higher level of maturity in one go. The maturity assessment, when in a descriptive or comparative stage, can be seen as a continues improvement cyclical process that has the phases of the Deming Cycle of 'plan, do, check, act' (Backlund, Chronéer, & Sundqvist, 2015), where the consultant continuously checks the state of the organisation and helps it improve over several years by iterating the process.

Figure 8 depicts structural elements. In order to be ranked in a certain level (a), the organisation has to prove that certain project management structures are implemented, as required by the definition of that level. By running an assessment and checking the availability or occurrences of attributes regarding the perspectives this can be achieved. These perspectives (b) can be focussed on people, processes or objects from a certain domain. To be able to rank the perspectives into the framework, assessments are applied in the form of interviews, questionnaires, analysis of documents (Albrecht, 2011), or attributes (c). All attributes are put against Key Performance Indicators (KPIs) or metrics, set by best practices (Backlund 2014). Subsequently it is tested if an organisation or department has implemented certain perspectives that are coherent to the level. Finally, the organisations maturity level achieved in single perspectives are aggregated to its overall project management maturity level (Christoph & Konrad, 2014).

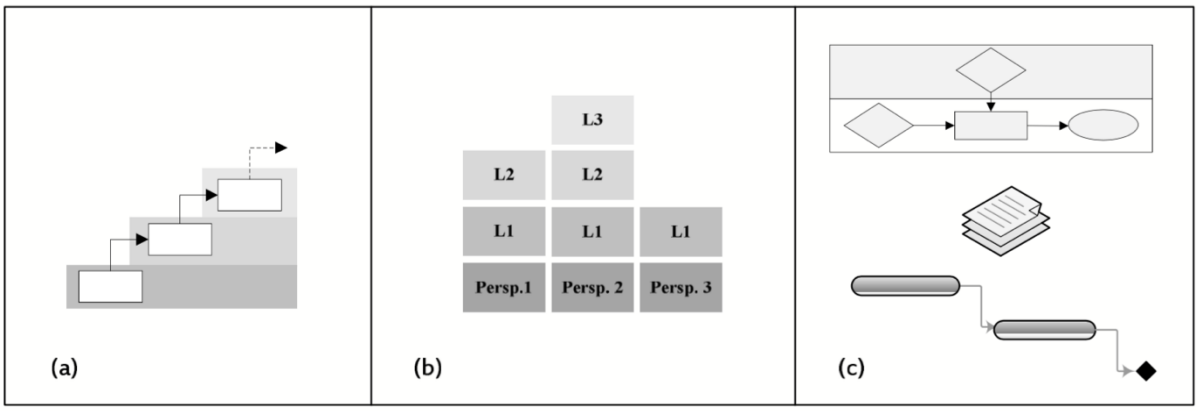

Figure 8: Structural elements of a PMMM (Christoph, 2014): (a) Maturity steps, (b) Perspectives, (c): Attributes

In addition, questionnaires are divided into a self-assessment part and the assessment by a consultant. The self-assessment is used to determine the maturity level against output of evaluated processes of the organisations attributes. The self-assessment is seen as the most important characteristic of a project management maturity model, and distinguishes itself from other improvement approaches models such as Total Quality Management or statistical process control (Kwak, 2015).

A typical CMMI based levelling system used generally amongst project management maturity models shown in Figure 9, is from an article of Demir and Kocabaş (2010) and is described briefly.

Level 5				
Continuous Improvement	**Level 4**			
	Benchmarking	**Level 3**		
Process Improvement		Singular Methodology	**Level 2**	
	Process Control		Common Processes	**Level 1**
		Process Definition		Common Language
			Basic Knowledge	

Figure 9: Maturity levelling project management maturity models Demir (2010)

- **Level 1 - Initial process or common language:** The organisation recognizes the importance of PM. There is need for well understanding the basic knowledge of PM, combined with common language or terminology. Awareness and project definition are the most important characteristic of this level.
- **Level 2 – Common processes:** The organisation recognizes that commonly used processes need to be defined and developed. This is in order to be able to get the success gained in a project, repeated in other projects. Also, in this level there is a recognition of the support and application of the key PM principals to other methodologies inside the organisation structure.
- **Level 3 – Defined process or single methodology:** All the corporate methodologies are combined in one single methodology, from which the PM is centred. This makes the control of the process control easier in comparison with multiple methodologies.
- **Level 4 – Managed process and benchmarking:** This level recognizes that the process optimization is needed in order to have a competitive advantage. Benchmarking is done on a continuous basis. The company decides itself whom to benchmark.
- **Level 5 – Continues improvement:** The organisation evaluates the information that is obtained by benchmarking. This information is then filtered and the decision is taken if it used to optimize processes.

2.3.2 Publications on project management maturity models

To be able to improve both project management capabilities of an organisation and organisational learning, it is required to get a thorough understanding of its strengths and weaknesses (Mullaly, 2006). Project management maturity models are a way to get insight in the organisation's capabilities. Development of the models has gained interest in recent literature (Backlund et al., 2014). Project management maturity models are widely used constructs to improve the project management performance (Brookes & Clark, 2009) and the many models indicate that they are important for project intensive organisations that want to be more efficient and effective (Fa Backlund et al., 2014). The application of project management benefit from when put in highly defined project contexts such as the Dutch Water Board.

An advantage of project management maturity models is that the assessments set a direction, prioritize actions and identify the current level of the organisation in tangible form of e.g. documents and surveys (Jugdev & Thomas, 2002). It allows an organisation to pinpoint perspectives it needs to improve in and shows a logical path towards improvement (Hillson, 2003). Also, the model enables to test the different project capabilities between organisations (Mittermaier & Steyn, 2009), benchmarking maturity relative to others. When an organisation uses the models, they create benefits in project effectiveness, efficiency and increase customer satisfaction in the long-term (Christoph & Konrad, 2014) and increasing the competitive advantage in the market (Backlund et al., 2014). Ibbs and Reginato (2002) shows in a quantitative study across thirty-eight companies and government agencies in four different types of industries that there is a correlation between PM maturity level of the organisation and cost and schedule efficiency in projects. A study of Ibbs and Reginato (2002) indicated that the greater the project management maturity, the greater the overall project performance is. This is however, not empirically proven. Nevertheless, there is empirical evidence for the use of maturity models and organizational performance. It bridges the gap between the strategy of the organisation and successful projects (Tahri & Drissi-Kaitouni, 2015).

Voivedich and Jones (2001) argue that when a maturity model is adopted, it enables a company to evaluate through objective measurement criteria its capability of a high degree of repeatability of the process. He also mentions that the quick gains can be reached, creating sustainable credibility internally in the management structure and with an external client.

Using project management maturity models is useful for an organisation when it is subject to '*external*' or '*internal factors*'. In this context with external factors is meant the influences of new technologies, change of structure or dynamics in an organisation. The models can help an organisation to focus on aspects of project management or on its context that need to be developed in order to further increase its capabilities. Or internal factors that an organisation need to improve to from within, to stay ahead of competition. Project management maturity models can diagnose and coordinate the improvements (Zweege, Meisner, & Weintré, 2009).

Project management maturity models assume their measurements can be objectively quantified, however processes rely heavily on the interactions of people, which is hard to quantify. As a result, the evaluations of the processes are exposed to subjectivism (Kwak, 2015). Also the focus of the areas that the organisations are researched in, are mostly on project management areas and not on the intangible assets (Jugdev & Thomas, 2002), such as the human factors (Brookes et al., 2014). They only focus on the work processes and some models ignore the human resource and organisational aspects (Jugdev & Thomas, 2002).

When only focussing on the process, the models tend to increase maturity by repeatability of processes for a higher chance of success in projects, however it remains the question if this is preferable or practical for the organisation's strategy (Mullaly et al., 2014). The models show how broad the existing toolkit of an organisation is and will help managers increasing and expanding it. However, that does not mean managers should use the most sophisticated techniques on every project. In a study of Christoph and Konrad (2014) he concludes that projects in a complex environment benefit more from a more mature project management organisation, then when operating in an environment with lower complexity.

The whole idea of the theoretical construct of the maturity models seem to be that the lowest level is informal and not well documented and operating on the highest level everything tends to be formal and structured. However, when all projects use formal structures without taking complexity in consideration, can be at some point counterproductive. Creating dissatisfaction amongst project personnel, for the project manager in particular (Christoph & Konrad, 2014).

There is no model that has reached general acceptance by organisations. All models are associated to a standard or methodologies it is based on. However, organisations can have different standards or methodology implemented in the organisation, than the intended maturity model. Therefore, the model proposes a certain direction, without including the organization own intent, processes, geography or industry and making it less relevant for the organisation (Kwak, 2015). In addition, the models are overwhelming in their methodologies, making them impractical for use. Besides, organisations adopt different technologies, management systems, policies and methodologies constantly. Having maturity models bound to certain methodologies, creates inflexibility and less relevance (Jugdev & Thomas, 2002).

For an organisation it is very difficult after selecting a model with a large number of indicators to create focus necessary to direct the organisation towards improvement. Also a path can be specifically indicated, however the recipients of process changes are not passive elements. They need to converse about it, seek innovations, experiment with them and develop them (Fernandes et al., 2015). Having fixed procedures in them will not create the necessary space for e.g. human processes.

Van Looy et al. (2011) suggests that there is a need for a project management maturity model that expands its focus from process maturity onto a broader awareness of the organizational maturity. They must go beyond a focus that is limited to uniform processes and their prescriptiveness within given standards. They should consider the broader organisation and its contextual factors that influence how their projects are managed (Mullaly, 2014; Kwak, 2015). There should be a focus on a model that is 'fit' to the organization, ranging between control and flexibility (Christoph & Konrad, 2014).

2.3.3 Model selection for analysis

For this study three models are selected on the basis of four criteria. In the first criteria, the model's basis, publisher and project management standard is evaluated. In literature most mentioned models are founded on standard PMBoK and basis CMMI. For this reason, it would be relevant to test three models that have a different publisher, standard and model basis, compared to each other. In the second criterion, the models are evaluated if they are recently adapted or not. Project management is developing fast and is subject to changing dynamics. Selecting models that have recently been adapted, would be more relevant. The more recent a model is adapted, the higher it will score. The third criterion is looking at how much information about a model is available for this research. Mann (2007) mentions that most models tend to have not much literature available about them, because one need to be qualified and be a trained consultant in the maturity model in order to gain access to all the information. The more information about a model is accessible, the higher it scores on this criterion and the better a model can be analysed in detail. The fourth criterion considers the orientation of a model. A model should be widely orientated, focussing on the overall aspects of the organisation that might influence the project management capabilities. The broader the model is orientated, the higher it scores. The scoring per criterion between ++ (the highest score) and -- (the lowest score). The three maturity models that have a different basis and standard compared to each other and have the highest score on the other criteria on average, are selected. Table 2 shows the models that have been viewed and rated according to above described criteria.

Maturity model	P3M3	OPM3	MINCE 2	IPMA OCB (DELTA)	PMMM (Crawford)	CMMI	EFQM
Publisher	OGC	PMI	Van Haren	IPMA	PM Solutions	SEI	EFQM
Basis	CMMI	CMMI	EFQM	CMMI and EFQM	CMMI	CMMI	EFQM
Standard	Prince 2, MSP	PMBoK	None	IPMA	PMBoK	None	None
Information available	Selfassessment	Book	Book	Book	Book	Book	Book
- Detail	--	++	++	++	++	++	-
Date	2010	2003	2007	2016	2015	2009	2012
- Year	+	--	+	++	++	+	++
Orientation	++	++	+	++	+	-	++
- Software	No	No	No	No	No	Yes	No
- Project management	Yes	Yes	Yes	Yes	Yes	No	Yes
- Program management	Yes	Yes	No	Yes	No	No	Yes
- Portfolio management	Yes	Yes	No	Yes	No	No	Yes
- Organisation	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2: Maturity model rating

The three models that have been selected are IPMA OCB, MINCE2 and PMMM. They have scored on the criteria highest on average and have different publishers, basis, and standards in comparison to each other. The other models did not score high enough on the criteria in comparison to the three models. OPM3 is widely orientated and has a lot of information available, nonetheless it is not a recent adapted model. The P3M3 and EFQM models both have a wide orientation and have recent information about the model available. However, this information is not very comprehensive. CMMI has updated, extensive, information available. But it is not focussed on the context of project management and scores low in this criterion.

About IPMA OCB, MINCE 2 and PMMM books have been written. The books are about the model functions and what is needed to be on a certain level of maturity, but not how to get to it. PMMM and MINCE 2 have small questionnaires attached to them, however they are not the full assessment models. The models analysis is further discussed in the next paragraph and they are summarized in Appendix A. Table 3 gives an overview of characteristics and qualities of the maturity models.

Maturity model	MINCE 2	IPMA OCB (DELTA)	PMMM (Crawford)
Basis	EFQM	EFQM/CMMI	CMMI
Standard reference	Own	Multiple	PMBOK
Scope	Organisation	Organisation	Project management
Maturity leveling	Level 1-5	Level 1-5	Level 1-5
Date of issue	2007	2016	2015
Publisher	Van Haren	IPMA	PM solutions
Support by publisher	High	High	High
Project, programm and portfolio management	PM	All	PM
Assessment Coverage			
- Subject	Processes	Compentences and processes	Processes
- Difficulty of assessment	High	High	Low
- Tangible results	Yes	Yes	Yes
- Continues	Yes	Yes	Yes
- Complexity	High	High	Low
- Details	Medium	High	Medium
Suggestions for improvement	High/Complex	High	Medium
Literature articles on succes	Few	Few	Many

Table 3: Selected model overview

2.3.4 Selected models

The selected models all have their own strengths and weaknesses. In this paragraph a summary is given of the features and highlights of the models. It focusses on the structure, the maturity criteria and reflects them against the located success factors and literature on maturity models in general.

2.3.4.1 MINCE 2

MINCE 2 is derived from European Foundation for Quality Management or EFQM. It is differently configured, compared to CMMI configure project management maturity models and does not have a framework to measure programme or portfolio maturity to analyse the organisation's overall maturity. They measure maturity from the perspective of several programs in the organisation that projects and activities entail. Activities such as processes, structures, tasks, responsibilities and permissions that are the responsibility of the line organisation and the projects that are responsibility of the project board or steering group.

Maturity is seen as "*the degree in which the organization is capable to effectively and efficiently act on changes and circumstances*" (Meisner, 2007). They measure maturity in six pillars or orientations. Each pillar has five levels of maturity that can be reached. Lowest level of maturity stands for an organisation reflected by inward individualism in the organisation and the highest level five for an organisation that is exemplary and dedicated in constant retaining quality. Highest level is suggested for organisations with high complex projects, but there is no best self-claimed highest maturity configuration. The model is dynamically structured according to the level of 'action favours' an organisation wants to improve in, dependent on the context and goals of the organisation. It does not test the organisations on processes, but on their operational level and their maturity level is based on interviews and surveys.

The aspects that the organisation is being tested on are: peoples' capabilities and training of people, communication, methods and techniques for projects, customer focus to improve quality of products, realisation capability for projects, learning ability of the organisation and supporting services in supporting and integrating changes, project effectiveness and organisational effectiveness in communication and translation of mission, the means, leadership. Of which most success factors relate to the articles of Fernandes et al. (2015) and Cooke-Davies (2003) that have been mentioned in paragraph 2.2.

The model has no real connection to a specific standard or methodology. The model is dynamic, giving the organisation options specifically in what they want to improve. There is a divers focus in the different perspectives of an organisation. The downside is that it makes it less understandable for an organisation, due to the way the model is divided and the way it creates interrelations. Because of this, the benchmarking capability of the model seems less clear. The model shows some elements of studies that have been used in constructing the model. Even so, there are no articles written about studies, experiences or results of organisations that have used the model. The model is further explained in Appendix A1.

2.3.4.2 Crawford's PMMM

Crawford's (2015) Project Management Maturity Model or PMMM looks at the processes of the knowledge areas of Project Management Bodies of Knowledge or PMBoK of PMI (2013), at five levels of maturity. To become a mature organisation, standards, processes and systems that support project management, should be integrated with all project processes and continuously be adapted by learning from structural analysis of former experiences. To get an indication of the maturity level of project management in an organisation, a trained consultant conducts interviews, self-assessments and evaluates them with supporting documents. They try to diagnose the whole organisation and give advice in how to further improve to other levels of maturity according to level criteria. With the found level indications, they can benchmark results with other companies that have been assessed with the same model.

The model shows a very strong relation to PMI's (2013) Bodies of Knowlegde (BoK), and gives advice in process and knowledge area specific advice. PMMM also focusses and assesses maturity of three components implemented in their knowledge areas i.e., Project management office (PMO) in *Project Integration Management* BoK area, management oversight in *Quality management* BoK area, and professional development in *Human Resource Management* BoK area. PMO oversees methodologies and processes that are used in projects and check the consistent and integral use of them. It also provides project expertise such as schedulers. Management oversight is looking at the involvement of management in the project. According to them, if there is no active involvement by management in holding project managers accountable for their actions, it will influence the integrity of the organisation. The last aspect that gets attention is professional development. According to the model and own study Strategies for Project Recovery (2011), it is important to have appropriate trained project managers and have them trained continuously, to maintain organizational and project success.

Due to the assessment structure of the model, the level of maturity of management of projects in the organisation become clearer to measure and benchmark. The model aims for a learning organisation that can adapt to changes and development in project management. However, it leaves out flexibility and interpretation of an organisations way of managing. Their definition of maturity by level is integrated in the knowledge areas. The model focusses on the projects how they are being managed according to their knowledge areas and expect the organisation to change its structure and culture with it. As mentioned by Jugdev (2002) before, project management organisations each have their own methodologies and standards, suggesting PMBoK as point of reference on which the entire model is build, can create misalignment with the interfaces and context of the organisation for measuring maturity. Also, project management entails much more than only the processes in which projects are managed and is being criticised by Jugdev (2002). Nonetheless, the model focus on increasing success factors of:

- Integrating departments and structures;
- Increasing the learning capabilities of the organisation employees and selection on skills in projects;
- Learning ability for project managers;
- Interrelation of project management processes;
- Clear information structuring and distribution;
- Organisation's and project management alignment.

Further details of this maturity model are described in Appendix A2.

2.3.4.3 IPMA OCB

IPMA OCB is a competence model that is focussed on the capability of an organisation to align and integrate its structures, cultures, people, processes and resources in their projects, programmes or portfolios within their governance and system construct. The philosophy behind the model is that an organisation needs to function as a whole, in order to become mature; it should be a learning organisation and maintain durable success for projects. The model tests not only the processes that are in place in the organisation, but it assesses the achievements and performance of the organisation itself, in which the projects and peoples' competences are seen as an integral part of the organisation.

IPMA OCB checks the organisations' competence on the subjects of Governance, Resources, Management and Organisational alignment. IPMA OCB is combined with IPMA Individual Competence Baseline (IPMA ICB), focussed on the competences of individual people, and IPMA Project Excellence Baseline (IPMA PEB) that is testing the Excellence performance of the management of projects, programmes and portfolios. The total of the three competence models make IPMA Delta create a 360-degree picture of the organisation (IPMA, 2016). In brief summary the model tests:

- The project, programme, portfolio and organisations strategy alignment;
- The project, programme and portfolio development status;
- Leadership of managers' status;
- Performance indications e.g., if the goals that are set, get delivered;
- The project, programme and portfolio management status;
- Alignment of external and internal processes of the whole of the organisation. E.g., project processes align with that of the organisation;
- Structural alignment e.g., organisations departments capability in supporting projects;
- Cultural alignment e.g., people's values and norms correlate with that of the organisation;
- The people's requirements needed in the organisation, competences, training abilities of the organisation and system for placement;
- Resource requirements needed in the organisation, status of the resources, missing resources and development needed resources for the organisation for further improvement (IPMA, 2016).

The model is comprehensive and tests the organisation's is total capability. Its construct has overlap and interrelation with the different supporting models. It is not only focussed on project management, but on programme and portfolio management, and the organisation as well. For further details, a summary of the model is given in Appendix A3.

2.4 Maturity model comparison

The models are compared to each other, based on the analysis and information abstracted that will be used for the building of the maturity model for the Water Board organisation. The analysed maturity models are very different from each other, however they have some similarities.

All three models claim to increase the organisational capabilities in project management. The PMMM has all maturity steps integrated in its Bodies of Knowledge and expects an organisation in some degree to use the processes and tools attached to it, in order to progress to a higher level of maturity. The model is very structured and has level indicators. MINCE is a more dynamic model that focusses on the organisations preference in a planned maturity growth path. The MINCE model has no obvious methodologies attached to it. Due to the broad focus, benchmarking between projects or organisations seems not possible from this point of view. Wherein, the PMMM has clear levelling indicators and an abstract structure that does allow for benchmarking. From what is seen, IPMA Delta seems, according to found information, to be the most comprehensive model. It tests processes inside the organisation and its competences. It focusses on the integration of all elements in the organisation, enabling project management to become mature. The model has next to project management many aspects that are programme and portfolio orientated, which are not relevant for this research. A disadvantage of the information available about the model is that it does not show structural elements or level indicators specifically.

All maturity models are different in how much attention is given to the subjects, however have an overlap in the following topics that are important for an organisation to reach higher maturity in:

- Standardised and adaptable, tools, methodologies, processes, and techniques.
- Capable project managers;
- Learning from projects;
- Education capabilities for project managers inside the organisation;
- Documented and structured selection of team members for projects based on skills;
- Organisation structures, supporting structure and processes align with its projects;
- Cultural alignment.

The topics mentioned are also important to increase chances in success in project management (Fernandes et al., 2015; Cooke-Davies, 2002). The topics will be further used to test the maturity of the Water Boards on in the first model and will be explained in Chapter 4.

3 Preliminary research

There are in total 23 Water Boards. The organisation structure differs per Water Board. Nevertheless, there are similarities between them according to interviewee. Each organisation has a general board and a daily board, both represented by the 'Hoogheemraad' and 'Dijkgraaf'. Underneath the board, there are different departments, all addressing certain aspects of the organisation. These departments differ in size and type, depending on the Water Board. Figure 10 gives an overview in form of an organisation chart of one of the Water Boards. The information is gained from an interview and documents. The interviewee at the time of the interview was the head of projects of the project realisation department. The interview topics were relating: structure of the organisation, project management methodologies and processes, types of projects and collaboration of departments and board. The full interview can be found in Appendix G1.

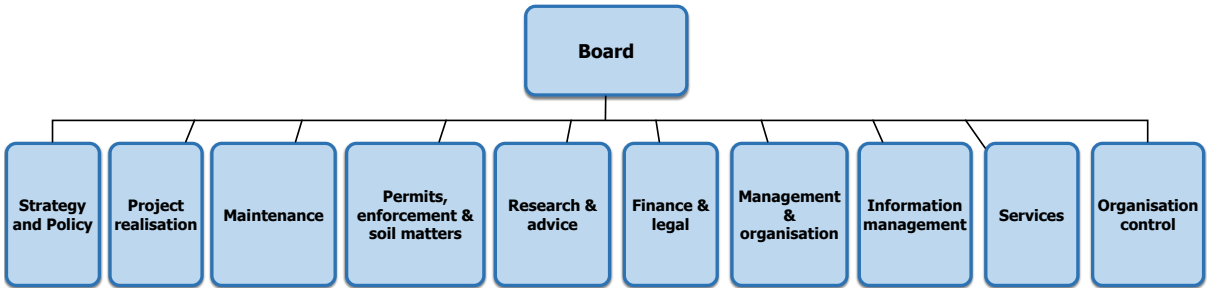

Figure 10: Organisation of a Water Board

3.1 Organisational structure

The departments of the Water Board are generally formed to initiate projects in Strategy and Policy, then design, construct in the 'project realisation department and maintain in the Maintenance department. The other departments are there to support projects directly or indirectly. Such as Permits, enforcement & soil matters, Research & advice, Finance & legal, Management & organisation, Information management, Services, and Organisation control.

Project initiatives come from board members or from the Strategy and Policy department. There is a total of four principals. Two of the principals are board member, responsible for the large programmes such as 'Hoogwaterbeschermingsprogramma (HWBP)'and 'Ruimte voor de Rivier (RvdR)', that will be discussed later. The board maintains the portfolio of the projects and all requests relating to budget in projects and need to be approved by them. The other two principals are in the department of head of planning, from the 'strategy and policy (Planning)' department and head of projects from the Project realisation department. Head of planning is responsible for initiating and designing spatial development projects. After the design is complete the project is transferred to the head of project and he is responsible for the realisation phase. Head of projects is also principal of the technical projects, such as water purifications and pumping stations or project leader is some cases.

The Strategy and Policy department has experts that have knowledge in ecology, hydrology and spatial issues. The project realisation department has specialists e.g., electro, mechanical and civil engineering. This Water Board had most specialities and the knowledge is maintained inside the organisation. This differs per Water Board according to the interviewee.

3.2 General process for projects

According to the interviewee, the Water Board follows a process in projects consisting out of four phases i.e., exploration, plan development, realisation and maintenance. For each project a project manager and a team is informally selected by the head of projects. During the exploration phase a plan is made by the project manager, with the help of experts in his team. A budget is requested at the board for the preparation of the exploration phase. If the plan and scope are accepted by the principal, the project can start the development plan. In this process alternatives are being developed and one thereof is chosen for the proposal to the board. With the budget that is requested in dialogue with the principal and the board, the plan is worked out in detail in the plan development phase and a plan of action is constructed. Budget is requested for developing the plan. The phase ends with a milestone, in which a proposal to the board is made and budget is requested for the realisation phase. If there is agreement and the budget is released for this project, the specifications are made. In collaboration with the procurement department the specifications are put on the market, in accordance with the Dutch regulations that apply for this project, to find a contractor. Contract is drawn up in association with the contract department. The contractor executes the project and the project manager maintains control and bears risks of the agreements that abide the contract. When there are time- or project cost overruns, extra time or budget is requested at the board. The realisation phase ends with a milestone, delivering a commissioning or transfer document. When the contractor finished the works, a transfer paper is made for the maintenance department that takes over in the maintenance phase. The project manager and his team make a project evaluation in order to share the knowledge with colleagues. There is focus on what is being spend in budget and what was planned beforehand, to improve budget planning for other projects.

Projects are controlled according to scope, planning, capacity, budget, risk, quality management and stakeholder management. These knowledge areas are further explained in Appendix B. Interviewee A (2015) indicates in the interview that they use documents setup by the organisations in order to develop projects, such as the discussed process. Their project handbook has influences of Prince 2, IPMA, but is referred for most part to 'Projectmatig creëren'. The handbook is not specifically bound to certain methodologies, standards or processes. They do have started to educate the people inside the organisation with IPMA certifications, to create a common language amongst practitioners of project management.

Furthermore, shown in Figure 11, the board checks up in the projects monthly with the project manager and the principal if he is not a member from the board, in a process meeting if there are not any changes in scope, planning, capacity, costs, risks, quality and stakeholders, that might influence the overall organisation or projects.

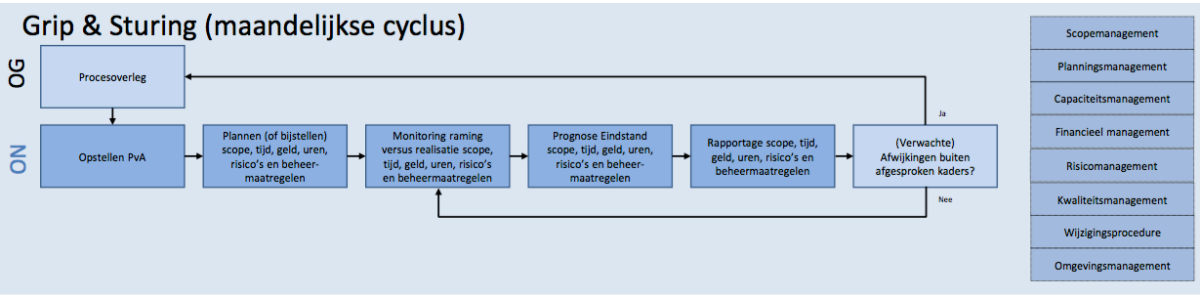

Figure 11: Project process at a Water Board

In order to further professionalise, according to the interviewee, the project should be scaled up to programmes. Instead of requesting budgets per project, a budget should be made free for projects according to a specific program. If the projects are controlled on performance overall instead of the controlling on budget, it gives freedom to not only control of the budget, but to management of people as well. The distribution of people can be coordinated better and Integrated Project Management (IPM) that will be explained in paragraph 3.4 can be used more efficiently. Another point of interest in further professionalising project management is to use evaluations more effectively than today. This is in order to increase the chance of projects being completed successfully.

3.3 Projects

The Water Boards have their own responsibilities for the management and maintenance of regional water projects consisting of self-managed and -financed projects in i.e., flood defence, water quality and water quantity. Flood defence projects entail the adaption of dikes to new heights and maintaining them to protect against the floods from the sea or rivers. Also dredging and sand supplementation are part of flood defence projects. Furthermore, Water Boards are responsible for the quality of surface water for agriculture, animals and consumption. The projects include construction and maintenance of sewage treatment plants. Water quantity projects protect against rising surface and ground water. Water Boards construct and maintain pumping stations, sluices, dams. Also maintaining head waterways clean by dredging and soil infiltration are part of the water quantity projects. The projects done by the Water Board themselves, without collaboration of other parties, are in this thesis further mentioned as 'Regular projects'.

The Water Boards also cooperate with RWS in national programs such as RvdR and HWBP. RvdR has the purpose to increase the capacity and storage of the rivers and to give more space for recreation and nature. A significant part of the projects includes improving and raising dikes or relocating them to increase the size of riverbeds, but also deepening riverbeds, digging side channels and removing obstacles (Rijksoverheid, 2015). HWBP projects are to check and adapt dikes, dunes, sluices and pumping stations. The sharing of costs and risks between RWS and the Water Boards depends on the programme. RWS has developed an own methodology to control the projects, which the Water Boards use and create a common structure and communication. For that purpose, RWS has facilitated training in IPM for the Water Boards.

3.4 Organisation of a project management teams

In this last part of the chapter the organisation of the project management teams is explained. There are two ways projects are managed in the Water Board. One is, management of projects with an integral project manager, who bares all responsibility of the management project control, risks, stakeholders, contract and quality. The team of an integral project manager mostly consists out of specialists. The other is project management in a IPM structure and divides the responsibility over different people.

In the HWBP project RWS has introduced the IPM model. This is used to create more uniformity and standardisation inside their projects. The emphasis is on cooperation and maintaining quality. The model works with process a model structure according to Figure 12. As can be seen the model has two large blocks, one the integrated project management that contains three different disciplines i.e., technical management, stakeholder management and contract management. In this block the stakeholders, surroundings, tender procedures and contracting are managed. The other block is integral project control that contains planning management, scope management and cost management disciplines that are the responsibility of the manager project control. In between, the internal and external risks, where the project is exposed to, are managed (van Heeren, 2010).

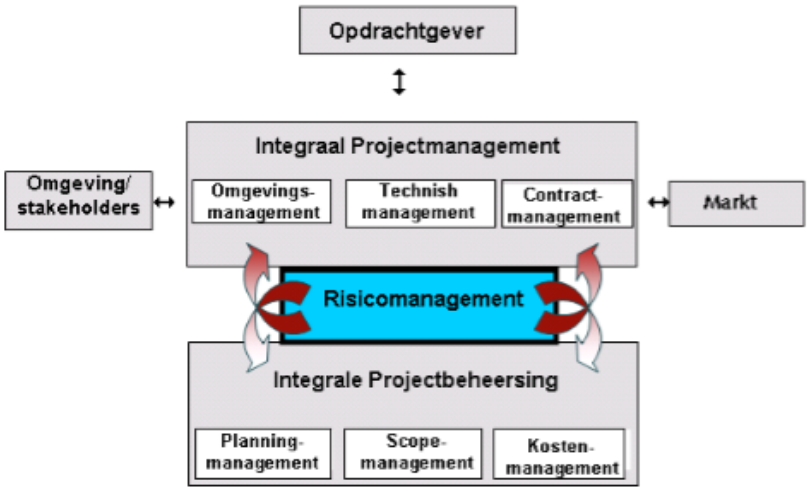

Figure 12: Process model structure of HWBP (van Heeren, 2010)

The model has five roles and this is illustrated in Figure 13 on the next page.

The first role is that of the project manager who is responsible for the general results of the project within the specified constraints in terms of time and money. He is teaming with the principal of RWS. He further controls the project team and secures the cooperation between the different team members.

The second is manager project control that is managing the quality, budget, time and scope. Every activity of the project must demonstrate the effect it has on time and budget. This way the project quality, time and budget are integrally controlled based on risk management. The manager project control is responsible for the risks on the aspects of time, budget, quality, scope and risks.

The third is a stakeholder manager who responsible for the social embedding of the project and is the intermediate between the project and its surroundings. The stakeholder manager is also responsible for the risk management of the stakeholders.

The fourth is the technical manager who is responsible for the substantive contribution to the project e.g., technical scope, technical specifications.

The fifth is the contract manager who is responsible for process-based controls to determine the purchasing needs, the preparation of the procurement plan, contract preparation, tendering and contract management within the constraints of time, money, quality and risk.

An addition of the team, but not taking part in either of the five roles, is the project controller. The project controller checks if the project is controlled on all aspects, from the perspective of the principal as well that of the project manager.

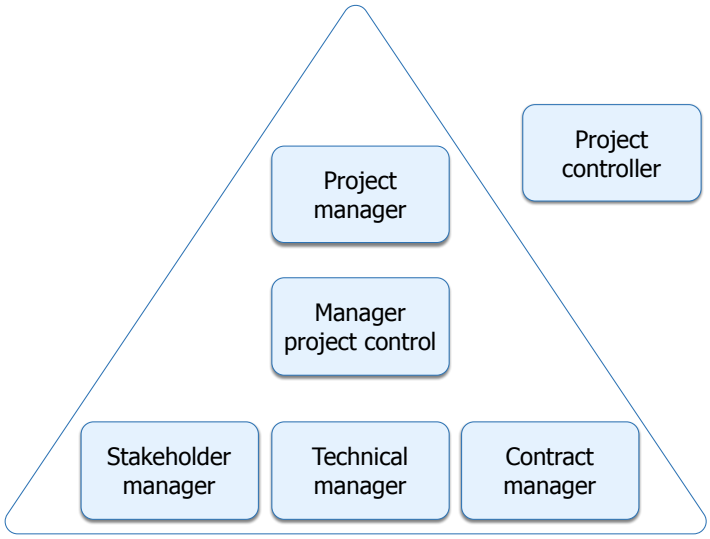

Figure 13: Five IPM roles and project controller

4 The first model

With the information that is gained from literature on project management, maturity models and preliminary research at one of the Water Boards, different perspectives on maturity are abstracted and designed into a first model. For the building of the model, articles De Bruin et al. (2005) and Pöppelbuß and Röglinger (2011) will be used as a reference that suggests a way in how to design a maturity model Paragraph 4.1 explains the proposed maturity model and paragraph 4.2 explains the model scoring and the interview process. A simplified illustration is shown in Figure 14.

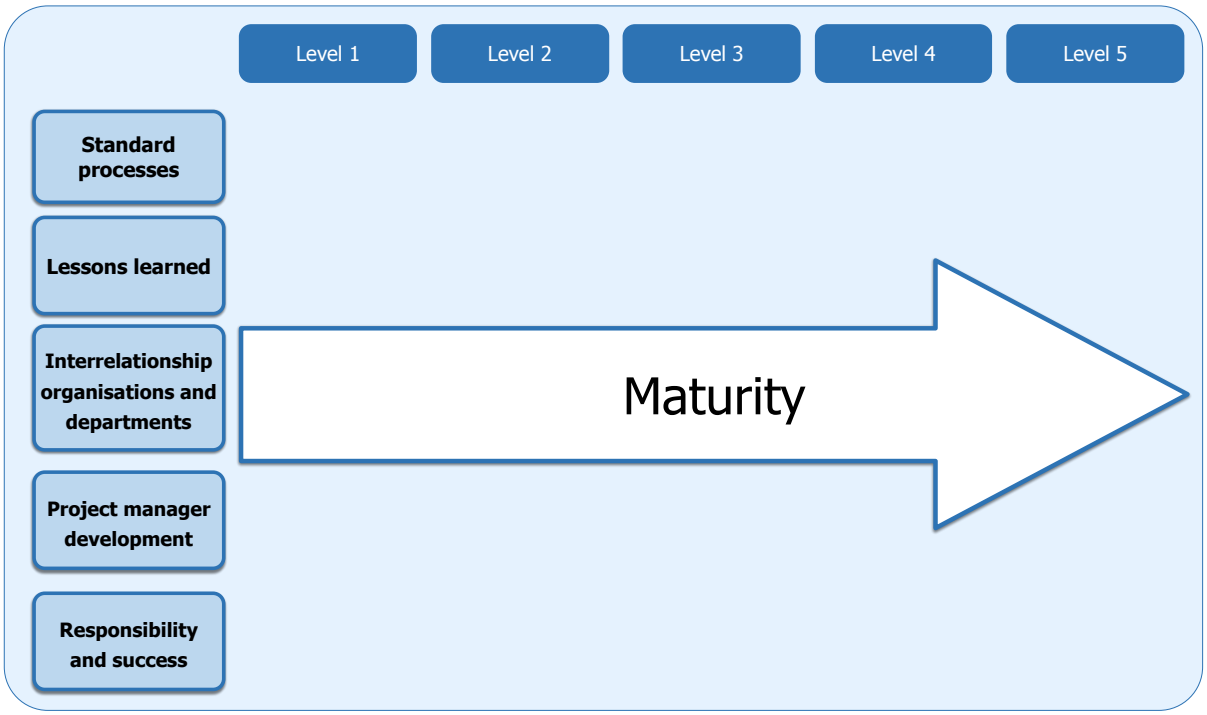

Figure 14: First model

4.1 Maturity Perspectives

When building a maturity model, it needs to be decided what the function of the model will be: descriptive, prescriptive or comparative (Pöppelbuß & Röglinger, 2011). A Water Board needs to know where it stands, to be able to improve. For this reason, the model is made descriptive and is used as a diagnostic tool. It assesses the as-is situation of the tested Water Boards. It also shows the different levels of maturity that can be reached, but it is not prescriptive and however it shows steps that need to be taken in order to reach a certain level. The model is also comparative, enabling to find differences and similarities in same industry project management organisations by benchmarking the as-is status. To increase the comparability, the model uses the five level system commonly used by maturity models (Demir, 2010).

Many maturity models do not have a central definition of maturity (Pöppelbuß & Röglinger, 2011). The same applies for this first model. The definition of maturity for the Water Boards is being researched, with the help of this maturity model. This maturity model assesses the Water Board organisation on five levels of Maturity Perspectives: Process standards, Lessons learned, Interrelationship organisation, Project manager development and Success and Responsibility. These Maturity Perspectives have been deducted from project management improvement literature and analysis of the existing maturity

models. Crawford's (2015) PMMM has been used as reference for the level build up. The Maturity Perspectives will be explained further in this paragraph in what they entail, why they are relevant to test and what their levels indicate. The model is described in Dutch in Appendix C.

4.1.1 Standard processes

With the Maturity Perspective Standard processes is meant the use of standard project management tools, techniques and methodologies, by the organisation. The use of standard processes for project management increases the capability of the project management organisation. Especially when these are tailor made to fit a project as mentioned in paragraph 2.2 by the article of Fernandes et al. (2015). The three maturity models that have been analysed in paragraph 2.3.4 include this Maturity Perspective as well. Making it seem an important part for an organisation to improve in, in order to become more mature.

If an organisation is on level 1 in this Maturity Perspective, it means that it does not have process standards. The approach in project management differs per project and the capability of the project manager and its team. Being at level 2 means that the organisation has certain process standards, however they do not regularly apply them in projects and they are not an organisational standard. Level 3 means that there is one organisational process standard and is applicable for all projects, but not adaptable for every project nor are they mandatory. In level 4 the organisation has adaptable process standards per project. The processes are adapted with lessons learned from previous projects. On Level 5 an organisation has the processes standards are adaptable per project and continuously changing with new gained insights from past experiences and lessons learned of projects.

4.1.2 Lessons learned

This Maturity Perspective rates the organisation's learning ability along the project processes. It rates how well an organisation is recording and analysing the lessons for next projects or use to improve their project management processes standards. In paragraph 2.2 the article of Cooke-Davies (2002) emphasize the importance of using past experiences of projects in the next projects for increasing the chance of continuous project success inside an organisation. Crawford's PMMM sees a continuous learning organisation as most mature. The other two analysed maturity models in paragraph 2.3.4 also see learning ability inside project management as an important parameter to measure maturity of an organisation in. Hence making the Maturity Perspective relevant to use in the model.

Level 1 indicates an organisation that does not learn from projects at all. If an organisation is on level 2, the lessons are learned on an ad-hoc basis. Project evaluations are sometimes done at the end of the project and analysed for lessons. Level 3 indicates that an organisation has the ability to record evaluations and analyse them on a structural basis. However, the dissipation of lessons learned amongst other projects is not done regularly. An organisation in Level 4 shows that they incorporated a process in order to record, analyse and dissipate lessons from projects. In level 5 the organisation is capable in continuously adapting their project management standard processes. They seek ways order to learn from projects in more efficient and effective ways.

4.1.3 Interrelationship organisation

With organisational involvement is meant how much the organisation is involved in the projects. This is being looked at from an indirect level, in which management of different layers of the organisation are involved with the projects by reporting, meetings and participation. But also at a direct level of

insight with the use of tools used by the organisation, different processes and possibly participate in steering in projects. Interrelation of different parts of the organisation is seen as an important factor by Fernandes et al (2015) for the improvement of the project management capabilities, mentioned in paragraph 2.2. The whole model IPMA OCB emphasizes interrelationship of the organisation in project management, in order to become mature. The other two analysed maturity models have also paid attention to the interrelationship. PMMM test the level of integration in Management Oversight. The MINCE model tests it indirectly, by the construct of the model. For these reasons it is seen as an important perspective to measure maturity.

Level 1 indicates that an organisation, line management and principals are involved on an ad hoc basis. The different departments inside the organisation, other than the project departments, are not involved in the projects. In level 2 the organisation is more involved when there are changes in the scope that have influence on general budget or time. Other departments support the projects, but do not collaborate with them. In level 3 the project plans are connected to that of the organisation. Updates in changes towards the organisation in projects are done regularly. Other departments collaborate with the projects in certain phases. Level 4 indicates that the organisation's schedule is intertwined with that of the projects. With their expertise other departments are continuously involved in the projects. On level 5, the organisation is interactively involved in the projects. The projects are managed according to the plans and schedules of that of the organisation. They continuously look for improvement on this aspect. Other departments are part of the project team.

4.1.4 Project manager development

The Maturity Perspective checks in levels how much an organisation is consciously placing the capable project managers inside teams and how much the organisation is supporting education for its project managers. Also on what ground project managers are selected and if they are tested on competences. Having a capable project manager is being emphasized in MINCE, PMMM and IPMA OCB. The three models also test the education possibilities inside the organisation. IPMA OCB tests in combination with IPMA ICB the competences of the project manager specifically and shows the importance of having competent project managers inside the organisation. Paragraph 2.2 refers to three articles. The first article of Fernandes et al.(2015) emphasizes on the importance of having good training capabilities in the organisation. The second article, that of Yazici (2009), indicates the importance of right placement of people in projects and the third article of Turner & Müller (2005) indicate the importance of personality and leadership of a project manager. Hence making this Maturity Perspective relevant for the model and to test the Water Board on.

An organisation at level 1, indicates that project managers are not hired according to specific requirements. The organisation has no training capabilities for the project managers. Level 2 indicates that there are rules for hiring a project manager. Important education for the project manager is being encouraged by the organisation. On level 3 the project managers need to fulfil certain requirements in order to be hired. Project managers are being audited on project results and their competences are checked once. Education is adduced by the organisation. At level 4 the organisation has set strict requirements in order to hire a project manager. The competences of a project manager are checked regularly, in order to align the projects and capabilities more effectively. Training in certain courses is mandatory. Other courses that are not directly related to project management are encouraged and financed by the organisation. On level 5 an organisation is continuously checking the competences of project managers that are hired according to the adapting requirements. The project managers follow personal courses set out by the organisation that fit their competences, personality and ambitions.

4.1.5 Responsibility and success

It focuses on the cultural aspects inside the organisation, like on how success is celebrated and at what level in the organisation. But also, who is held accountable for the outcome of the projects and what level of the organisation is held accountable. It is mentioned in IPMA (2016, p. 38) shared believe and focus is seen as a factor that is "*needed for organisational competence in managing projects*". In MINCE 2 the responsibility and success elements are not mentioned specifically, however the acknowledgement is seen as an important factor. PMMM emphasizes that project managers need to be held accountable for their actions, in order to maintain a good functioning organisation. Hence making this Maturity Perspective relevant to implement inside the model.

Level 1 indicates that the project manager is not held accountable for project results and successes in projects are celebrated on a personal level. The project manager and its team are held accountable for the results of the projects on level 2. On this level the successes are seen as a team effort and celebrated on team level. In level 3 the project departments are seen as responsible for the success of a project. This success is acknowledged and celebrated by everyone in the department. On level 4 the results of projects are seen as an effort by all the departments involved. Success and acknowledgement is shared amongst all departments. At Level 5 the board feels responsible for the success of a project. The successes are acknowledged and shared within the whole organisation.

4.2 Interview & scoring procedure

The maturity of the organisation is tested with the aid of a semi-open interview including supporting documents and a self-test that is filled in by the interviewee. The chosen methods of interviews and self-tests are commonly used in maturity models (Pöppelbuß & Röglinger, 2011). The interview is divided into two parts. In Part one general questions are raised. The answers to these questions are relevant to get a situational understanding, which could be useful for adaption of the model. The second part is meant to test the level of the different Maturity Perspectives. In order to get a more accurate reading of the level of Maturity Perspectives, their relating questions and scoring are divided over nine Key Performance Indicators or KPIs. This structure chosen is a combination of the Crawford (2015) PMMM , that divides the different maturity topics over PMI's (2013) knowledge areas, and on the article of Christoph and Konrad (2014) that divides structures the basis of maturity models in Perspectives, Levels and Attributes, as seen in paragraph 2.3.1. The choice for this structure is to get a clear comparable structure to identify levels of the Maturity Perspectives.

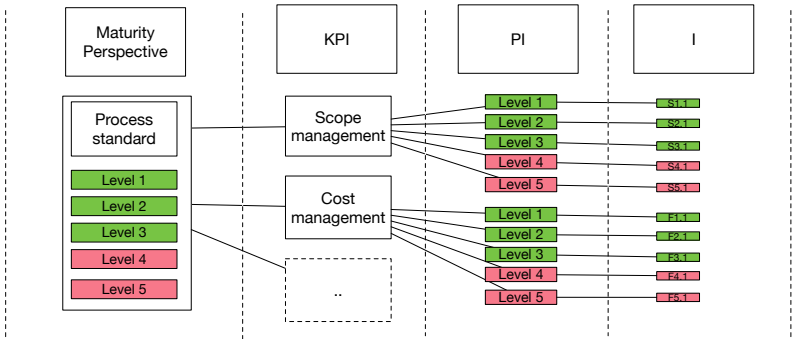

Figure 15: Maturity Perspective Level measuring

The KPIs are divided into different knowledge areas in which the Water Boards manage their projects, shown in paragraph 3.2, and other project management maturity relating topics. The answers to the Maturity Perspective relating questions correspond with KPI's Indicator (I) to one of the five Performance Indicator (PI) levels. If the answers and documents clearly point towards a certain PI level of a specific Maturity Perspective within that KPI, a PI level will be assigned. If indicator satisfies PI level 3, it automatically means that it satisfies PI level 1 and 2 as well. The total of the PI levels of the KPIs on the topic of that Maturity Perspective will give an average score for that Maturity Perspective. Figure 15 illustrates the way the scoring for a Maturity.

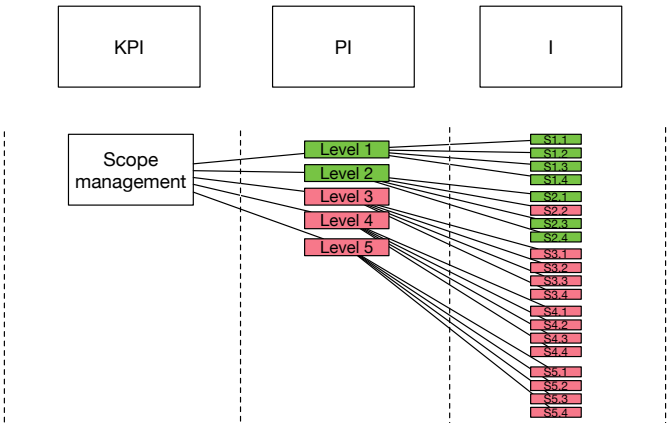

Figure 16: KPI scoring

The total scoring of all the Maturity Perspectives inside the KPI will also give an average score to the KPI as illustrated in Figure 16. This is to get an indication for the level of the KPI and if they differentiate from each other. The overview of the scoring model is located in appendix H. The KPI, PI levels and I description is given in Appendix D.

In the self-test handed over during the interview, interviewees can indicate the level of maturity they think their organisation is on and what their ambition is to grow towards. In the self-test they can also indicate reasons for their choice. The self-test is the same format as the model, shown in Appendix C. The results of the interview of the general information, the scoring of KPI and Maturity, and the self-test are held against each other in order to give a score to the Maturity Perspective the organisation is on according perspective of the interview. Figure 17 illustrates the entire procedure per interviewee.

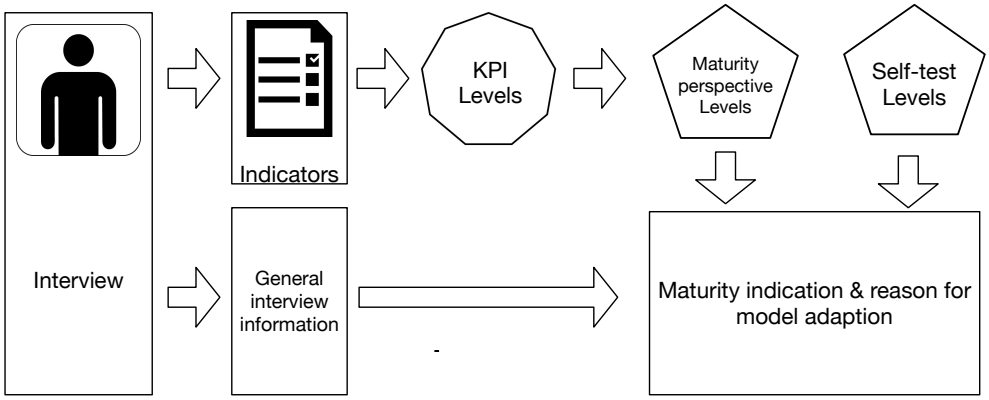

Figure 17: Maturity indication per interviewee

In the study case two Water Boards are tested. Each Water Board is tested from the perspective of one process owner and three project managers. The process owner has the overview of projects and of the way the projects are controlled. The indications of maturity of the organisation will be validated based on interviews with three project managers that are or were involved in different projects. Of which two projects are independently managed by the Water Board themselves and one HWBP project in which RWS is involved. The reason for interviewing two project managers of two different self-managed projects is to see if there are differences in the management and maturity between them. The reason for interviewing the project managers involved in the HWBP projects, is to see if there are differences in management and maturity, compared to the self-managed projects, due to the involvement of RWS.

The choice in project types was made after the preliminary research of paragraph 3.3 at one of the Water Boards. That showed the different projects the Water Boards are involved in. The choice for interviewing the process managers is to verify if the perspective of maturity is the same in a different layer of the organisation (Bruin, 2005). The individual analyses are found in paragraph 5.1 and 5.2. At the end of both paragraphs the projects and process manager's outcomes will be held against each other. In chapter 6 the different interview results of the process owners, project managers of self-managed projects and HWBP projects are compared to each other.

4.3 Answering sub-question 1

With the model build the sub question, *"What are the important factors to include in the Project Management Maturity Model and to test the Project management organisation of the Water Board, in order to measure their maturity?",* can be answered.

The important factors to include in the model to test the project management maturity of Water Boards in are divided into substantive and structural factors. These are included in the first model. Firstly, the contents of the model are divided into five Maturity Perspectives, that were important factors to test, according to literature to increase project success and these are overlapping topics in the three studied maturity models. The first Maturity Perspective is to test the organisation on their adaptable, integrated, project management tools, techniques and methodologies. This is tested in the model under the Standard Processes. The second is Lessons learned, that tests the learning ability of the organisation's past projects that is then used in coming projects. The third is Interrelationship organisation, wherein the organisation's level alignment of general systems and activities is tested with that of their project management. The fourth is Project manager development. In this Maturity Perspective the organisation is aware of the capabilities of their project managers to place them in projects and training facilities. Lastly, Responsibility and success Maturity Perspective to test the shared level of involvement and accountability in projects. Creating the awareness of the value of projects amongst personnel.

As for structural factors, the Maturity Perspectives are rated in a five level system, to create a comparable structure in order to test the different projects in the two water board organisations. In order to test it the Maturity Perspectives, the Indicators are divided in knowledge areas that are used in the Water Boards to manage their projects in and other Maturity Perspective related topics. To get the results, self-test and an interview are conducted. These will take place on different levels of the organisation and different projects. This is to rate the maturity level of the organisation in project management overall and to create a model to measure maturity with.

PART II / MODEL EVALUATION

5 Single-case analyses

This chapter discusses the interview results of Water Board A in paragraph 5.1 and that of Water Board B in paragraph 5.2. Each paragraph provides a summary of the case analyses per Water Board. The paragraphs end with a comparison per Water Board of the preceding cases. The full single-case analyses are located in Appendix I. The interviews can be found in Appendix G and the scores of the KPI levels and Maturity Perspectives are shown in Appendix F.

5.1 Water Board A

5.1.1 Process owner

The interviewee was involved in in the modification and adaption of project management processes. For the summarised interview reference is made to Appendix G2 and for the full analysis to Appendix I1.

According to the interviewee the organisation uses the different influences of HWBP and tries to implement these within the organisation. There are still differences according to the results of the interview in use of standards, process handbook, tools and involvement by the organisation per project. The project manager chooses tools and processes that seem applicable to the situation. However, the board needs to agree to the plan of every project and it has to have a certain comprehensiveness to be able to request budget for the project. The board is also involved in every project when it comes to changes in scope that go beyond the agreed boundaries that would affect general budget. The interview and self-test have indicated there are evaluations done in the projects however, they are not analysed structurally to use for future projects or project management processes. The ambition is to improve on this Maturity Perspective. The Project manager is motivated by the organisation to further educate oneself. The ambition is to further mature in this perspective. The Success and responsibility is at level 2 and they see no reason to further develop in this Maturity Perspective.

5.1.2 Project A

This project was executed in cooperation with the Province as part of a six-fold programme. The project consisted of construction of a 1,9 km long channel. The interviewee was the project manager of this project. For the summarised interview reference is made to Appendix G3 and the full analysis is located in Appendix I2

The use of standard processes for project management is partially self-interpretable. To establish if the followed procedures are in conformance with the standards is in some occasions checked by the board. According to the interviewee following of strict processes seems for all projects, even the smallest, to be excessive. But as long as processes are followed, no one is to blame for mistakes during projects according to the interviewee. The board is always involved when a project overruns the set of boundaries and if it influences the overall budget. Many knowledge areas are managed implicitly. Paying more attention to stakeholders could have prevented confrontations. Department involvement differs per knowledge area. In some cases, such as with the department of land acquisition, better cooperation could possibly be fruitful. Lessons learned Maturity Perspective is indicated on a low level. The way acknowledgement and responsibility is shared is seen as sufficient.

5.1.3 Project B

In this project a pumping station was renovated while the maintaining full function. The interviewee was the integral project manager. The interview summery is in Appendix G4 and the full analysis in Appendix I3.

Standard Processes were not mandatory or specified for the project. There were integrated systems e.g. planning with the organisation, but these did not function properly. Learning was at a lowest level of maturity and the interviewee did not see evaluations as moments when lessons are learned. Due to the size and context of the project it did not require extensive description in all knowledge areas. The project at that time is indicated low in on the Maturity Perspectives. The interviewee contradicts to the results of the self-test in comparison to the interview results.

5.1.4 HWBP project C

The interviewee was project manager and part of an IPM team. For the interview a summery reference is made to Appendix G5 and for the full analysis to Appendix I4.

The project is of high maturity. The project management standards and methodologies are sophisticated and elaborated on. Processes are followed and communication between the IPM team members, organisation and departments is frequent, allowing better control of the project on all aspects. Lessons learned Maturity Perspective is low levelled even in this HWBP project. The HWBP offers additional education. The ambitions are to share the information of projects to learn from them and to share information about projects with colleagues in general.

5.1.5 Differences and similarities

The differences and similarities in tested KPI levels enable a more detailed comparison view within WB A in how they manage their projects. There are large differences and similarities in KPI, as can be seen in Figure 18. The Maturity Perspectives are compared in this section as well, showing a more general overview comparison in height of maturity and is illustrated in Figure 19. Differences and similarities of the in self-tests will be discussed and are illustrated in Figure 20 and 21. This sub-paragraph is closed with a conclusion.

Figure 18: KPI levels of WB A

There are large differences between the projects. HWBP has an IPM construct and the others have the teams with specialists and an integral project manager. There are large differences in KPI levels between projects, as can be seen in Figure 18. In the HWBP project knowledge area, quality, risk and stakeholder management are more explicitly managed and are at a higher KPI level in comparison to the other projects. The HWBP project manager indicated and showed that tools had been adapted to the needs of the project. In the other projects the attention paid to certain knowledge areas, is partly self-interpretable by the project manager. However, the explanation and extensiveness should satisfy the board. Otherwise, budget will not be released in order to start the project. This generally requires a good elaboration of scope, cost and time management. This is also a reason why the KPI of these knowledge areas are higher in all projects, when compared to the other knowledge areas. Also the KPI level of capacity management level is closer related in all projects. This is because the methodology used to choose people for the team is the same in all projects. The head of the department selects people based on personal knowledge and not on recorded competences or performance of previous projects specifically. In some cases, the KPI levels indicated by the interview with the process manager are lower in comparison to the KPI levels of HWBP project. The reason is that the interview with the project manager of the HWBP gave more insight in their actual KPI level height.

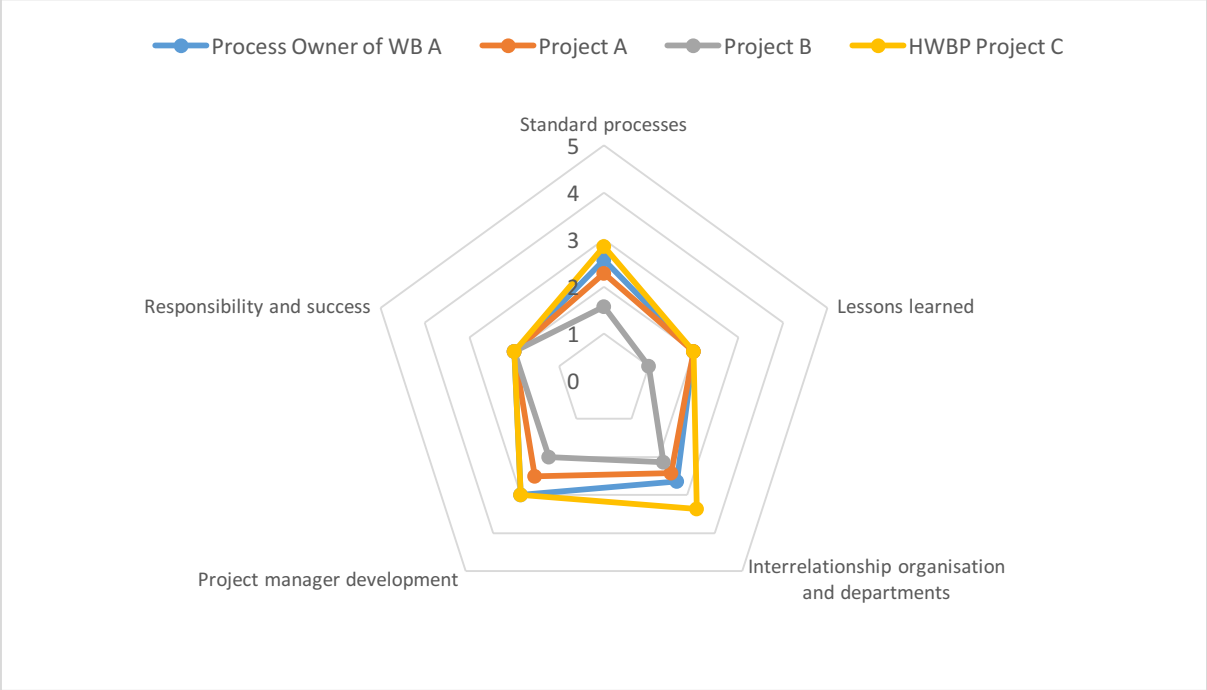

Figure 19: Maturity Perspective levels of WB A

Standard Processes Maturity Perspective of HWBP is higher than for the other projects. In some cases, the standards needed to be adapted to fit the context of the HWBP project, for example that was the case for stakeholder management. For Project B, standard processes were not prescribed, indicating the low score in comparison to the other Maturity Perspective Levels. This could be due to the size of the project and the attention necessary to be paid to the knowledge areas. But having an indication in knowing what processes are important per project could be a benefit, because sometimes the obligatory processes can be a nuisance for simple projects as indicated by the interview with the project manager of Project A. Dividing projects in categories, would help to avoid unnecessary processes. The process manager indicated that the organisation is working on that.

Lessons learned Maturity Perspective is at the same level in all the projects, except for the Project B, in which there were no structural evaluations at the time. The HWBP project team is trying to implement a strategy for recording lessons however, they have not succeeded so far. The ambition, as shown in Figure 20, is to further improve in this Perspective.

The organisation is more frequently involved in a HWBP project C, as indicated in Interrelationship organisation and department Maturity Perspective in Figure 19. One of the reasons is that here the principal is a member of the board. This way the project is controlled on more aspects by the board, other than only on budget. Which is the case in the projects, A and B. Also, according to the interview with the project manager there are more meetings overall and control in the HWBP projects to maintain schedule and budget. The reason is that there are project control managers in the IPM team and there is frequent programme manager involvement. The involvement ascertains that processes are followed accordingly and decisions are made integral in the team. In Project A and Project B decisions made to adjust the scope are up to the integral decision of the project manager, i.e. have a lower threshold. The process manager saw this as a problem. Also, as long as project processes set out by the organisation are followed to the letter, there will be no consequences when mistakes are made

according to one interviewee. Thus, indicating there is more interest in processes then in the actual results.

The interrelation of the departments in projects depends on the project. The HWBP project C has more direct involvement than the other two. Due to the size of the project more specialists and hands-on involvement is required. The HWBP project also has more focus on early involvement of different departments such as the maintenance department. Cooperation between departments could have benefited the situation in Project A preventing an incident with the department of land acquisition. There was no oversight or communication about planning schedules of both departments, which created a project delay.

Project manager development Maturity Perspective level indicated by the process owner is only applicable to that of the HWBP project, in which the project manager is getting more education. According to the process owner people are selected and categorized on the basis of competences. However, this is not verified by the interviews with the three project managers.

Apart from differences in size, context, KPI levels and Maturity Perspective levels of the projects there are some similarities. The Maturity Perspective Responsibility and Success is indicated on the same level in all interviews. Two of the four interviewees indicated, as shown in Figure 20, that they would like to share project information and more acknowledgement. Another similarity is that the same procedure needs to be followed when asking for budget at the initiation, design and construction phase. Also, when changes in scope appear and affect the budget. Amendments need to be proposed and budget is requested from the board, disregarding the size of the project. Another similarity is that people are selected the same way for every project, the principal in dialogue with the project manager makes a list of people that seem fit for the project and gives it to 'Strategy and Policy' department or the 'Project realisation' depending in which phase the project is. They are checking if people are available. Otherwise it needs to be outsourced and the department of 'Finance and Legal Affairs' needs to take care of it.

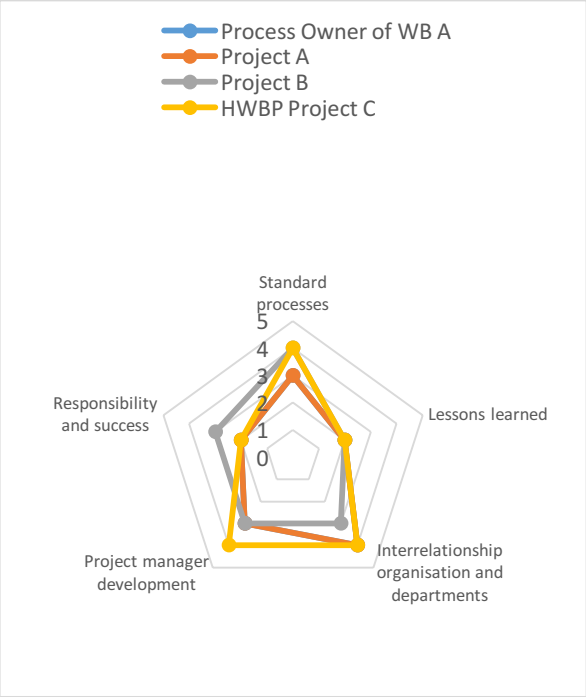

Figure 20: Self-test scores of WB A

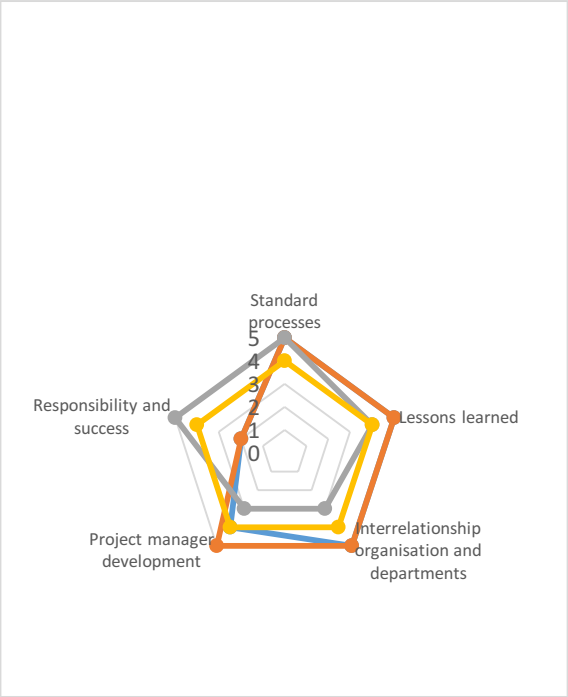

Figure 21: Ambitions of WB A

The differences between Figure 20, the self-test results, and Figure 21, the level indications from the interview, are explained in Appendix I1-I4. However, after observing that more respondents indicate levels structurally higher, could indicate overconfident staff to avoid damage to the organisation's reputation. The interviewees have generally the ambition to improve in all Maturity Perspectives. Two interviewees specified that Interrelationship of the organisation could be improved on, by specifying the role of the principal. Also by a better working system, general financial system and time tracking system for all projects. Maturity Perspective process standards could be further improved on, but it they are in need of a quality manager. Lessons learned Maturity Perspective needs to be improved on by doing meta-analysis and structural sharing. The interviewees also have the ambition to further improve on Project manager development, but that depends on the position of the project manager.

The HWBP Project C is more mature in the Perspectives of Process standards, Interrelation of departments and organisation and project manager development. The different knowledge areas are managed explicitly. Other projects can be more self-interpretable and are interwoven in the scope description. In some cases, it could have benefited the regular project situation if there was paid more attention to knowledge areas. In all projects, even the smallest, processes are obliged to be followed to a certain extent. Categorization of projects could avoid following excessive processes and this is being worked on by the organisation.

For all projects a budget needs to be requested at the board, this applies also for amendments. IPM creates integral decision making in a team. In this way decisions are made in dialogue and cannot be made by the project manager himself when compared to the regular projects. With regular projects this way the scope can easily be adjusted, as long it stays within the limits set by the board. The IPM construct in HWBP is also leaving less manoeuvrability room in the scope in comparison to that of the board. Another similarity in all projects is the way Capacity management is done, indicated as a lower maturity overall. The ambition of all the interviewees is to improve on all maturity aspects. Except for responsibility and success, in which only two interviewees want more acknowledgement and better sharing of information.

5.2 WB B

5.2.1 Process owner

The interviewee is head of the project realisation department of WB B. The interview summary is located in Appendix G6 and for the full analysis reference is made to Appendix I5.

According to the interviewee, HWBP has brought integration of organisation and departments, and standardisation for project management into the organisation. According to the interviewee, the roles of the board have to adapt to the new situation. With all new developments introduced by HWBP there is still room for improvement on the different maturity aspects such as Lessons Learned.

5.2.2 Project D

This project provides the connecting element of ecological zones. The total of the stream was two kilometres long. The interviewee was integral project manager. The interview summery is placed in Appendix G7 and the full analysis in Appendix I6.

The Maturity Perspectives of this project scored level 2 on average. The ambition is to improve on all of them. Cost, time and scope management are most advanced of all knowledge areas. According to the interviewee this should change, because other aspects e.g. quality management are becoming increasingly important. The same goes for specifying and better control in capacity management, due to the change in organisation structures in IPM and programme management.

5.2.3 Project E

The project's goal was to make sure that sewage water did not mix with the surface water and the other part was widening a waterway preventing surface water to flood into the neighbourhood. The interviewee was integral project manager of the project. The interview summery can be read in Appendix G8 and the full analysis in Appendix I7.

The Maturity Perspectives for this project scored low around level 2 on average. The use of standards was up to the interpretation of the project manager. The interviewee indicated that this is fine the way it is and there should not be too much interference in projects by excessive use of process standards or by the organisation.

5.2.4 HWBP Project F

The total of four projects consists of improvement defences over a stretch of 22 kilometres along the lakes. The interview summery is available in Appendix G9 and the full analysis in Appendix I8.

The Standard processes have been adapted in the organisation due to the influence of the HWBP projects. IPM structure creates more accurate control, than the boards control in general. The influences and lessons of HWBP projects are not well coordinated and have influence and put pressure on different levels of the organisations. The ambition is to further improve in all Maturity Perspectives, except for the responsibility and success Maturity Perspective. Lessons learned need to improvement for all projects and project could benefit from tools that can be adapted depending on the context of the project.

5.2.5 Differences and similarities

The differences in tested KPIs are first evaluated per interview. This enables to get a more detailed comparison view in WB B on how they manage their projects. There are large differences between tested KPI levels, as can be seen in Figure 22. The Maturity Perspectives are compared in this part as well, showing a more general overview comparison in the levels of maturity as illustrated in Figure 23. Then the Self-test and ambitions are compared, which are illustrated in Figure 24 and 25. The sub-paragraph ends with a conclusion.

Figure 22: KPI levels of WB B

The diagram of KPI level indications of two projects in Figure 22 show that the Knowledge areas of scope, cost and time management KPI levels in the projects are closer related. The reason is that the process standards and tools of these knowledge areas generally have a higher standard quality in HWBP and the other knowledge areas are managed implicitly in regular projects. This has partly to do with the requirements set by the board. In HWBP one must manage different knowledge areas more specifically, due to the size and complexity of the project. Also, the boundaries set by the IPM team are even stricter and more explicit on the different knowledge areas than the boundaries imposed by the board, according to the interview with the manager process control of HWBP. The manager process control also mentioned that the actual interest in projects for the board is maintaining on budget in all projects. For HWBP projects this is becoming less relevant. The IPM team in the HWBP projects make sure that there is no chance of scope changes and decisions are made integrally in the team. Projects with integral project managers still had a lot of room within the defined boundaries and there was no strict control.

Also capacity and stakeholder management show similar levels. The process of capacity management in teams has generally stayed the same on a lower level of maturity. The selection is based on knowledge and past experiences. The head of the department teamed up with the principal and project manager in selection process of people for the project. However, due to the merger of projects

departments and differences in team structures, there are less people available according to three interviewees. Making it harder to create complete teams for projects.

Stakeholder management in the regular projects is managed more implicitly and indicated on a lower level. The reason that the HWBP project is also closer related to the KPI level of the regular projects is because there was no process standard prescribed for this. However, it is indicated slightly higher, due to the boards involvement in stakeholder management.

Figure 23: Maturity Perspective levels of WB B

As can be seen in Figure 23, the Standards processes maturity level indication of the projects scored lower than that of the process owner. This could now be at a higher level, but at the time the projects were executed, the regular projects were not using standards for every knowledge area specifically. And at the time of the HWBP project, the processes, standards and configuration of the organisation were not up to the standard of HWBP. Indicating a lower score than level 3 on the Standard Processes Maturity Perspective.

Lessons learned are indicated on level 2, except for that of the HWBP project that was indicated on level 3. The audits and evaluations are done structurally in the HWBP, in comparison to the regular projects. According to the process owner, analysing evaluations was not the only way for them to learn lessons from projects. He believed that it is important to place the people with the right experience on the right place, however this is also being commented on by the manager project control. The lessons learned in HWBP are now depending on the people that worked in it and there is no coordination by the organisation, diminishing the chance of effective implementation of the HWBP lessons.

Interrelationship organisation and departments is at a higher level in HWBP than that of the regular projects. The different project departments are working together more regular in the HWBP project, which is also valid for the supporting departments. The board in the HWBP project is also more involved.

The process owner indicated a similar level as HWBP, but this was not indicated according to the interviews with the project managers of the regular projects.

The process manager interview indicated a level 3 for the project manager development, however the other three interviewees indicated differently. Project managers are mostly IPMA certified and there is a budget for the project managers to use for educational purposes. The process owner mentioned that the selection and placement of project managers is being more focussed on competences, however it was not confirmed by other interviews and it seems to be more an implicit than an explicit focus on competences. Making level 2 and better indication of the organisation's level.

Responsibility and success Maturity Perspective could not be assigned to one level. The project manager is held responsible and indicates level 2. But the acknowledgement differs per project size and can be on all levels. This was confirmed by the results of the self-tests.

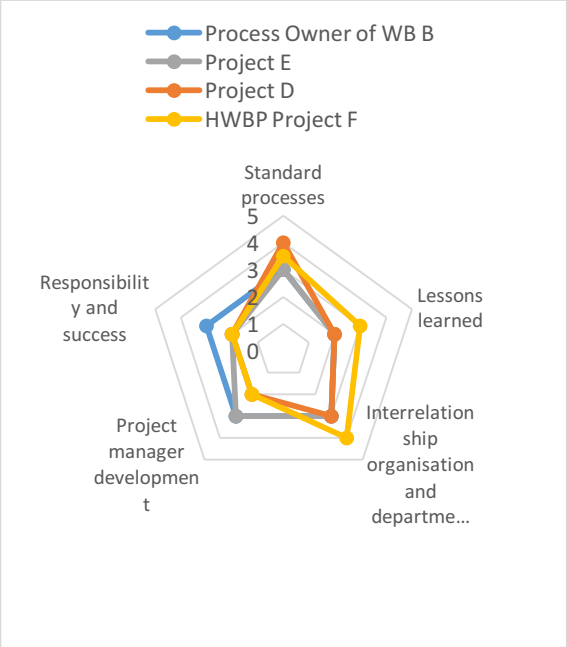

Figure 24: Self-test results of WB B

Figure 25: Ambitions of WB B

The self-test scores can be seen in Figure 24. The reasons for the difference in levels between the levels indicated by the interview and that of the self-tests are provided in the individual analyses in Appendix I5 – I8. However, all the interviewees want to improve in all maturity aspects as can be seen in Figure 25, except for the responsibility. Success is different for every project and nuances could not be indicated in the model. Projects would benefit if standard process maturity level would increase. One interviewee mentioned that the project, especially larger ones, could benefit from adaptable project management tools. Others indicated that there is a need for standardisation in all knowledge areas. According to the ambitions lessons need to be recorded and dissipated in a more structured way, to be able to learn from them. Interrelation of organisation of departments level is increasing in different projects, but collaboration can be improved. Project manager development could be improved and more focussed on competences. But this is dependable on classification level of the project managers and roles.

HWBP cannot only be seen as a flywheel for development, but there also seem to be large differences in maturity compared to the studied regular projects. Difference in teams, involvement, control, use of knowledge areas in projects and lessons learned. These differences made in the organisation to facilitate and control the HWBP project also puts pressure on the availability of people for projects in general. Experiences in HWBP are not well coordinated to be effectively implemented in the organisation. The organisation could improve by structurally analyse and dissipate lessons. This is also the ambition. Generally, the interviewees have the ambition to mature in standard and explicit management of knowledge areas and to create preferably tailor made project management tools. Interrelation of organisation departments has become more mature, according to the interviewees, but maturity in this perspective is only demonstrated in the HWBP project. Two interviewees also indicated that the board's control on budget for every project is becoming less relevant, due to the IPM construct and general involvement of the organisation. The model did not give a good reading on the Responsibility and success Maturity Perspective.

6 Cross-case analysis

To understand the similarities and differences between both Water Boards they are to be compared with each other. The cross-case analysis is meant to find possible connections between the Water Boards or to reveal new insights that were not shown in the individual analysis. In this paragraph the process owners, regular projects, HWBP projects and the self-tests of both Water Boards are being compared.

The organisational build-up of both Water Boards is similar. They have the same project orientated departments and similar departments that contribute to and support in projects. The process owner scores are compared, as can be seen in Figure 26 and 27, and interviews discussed.

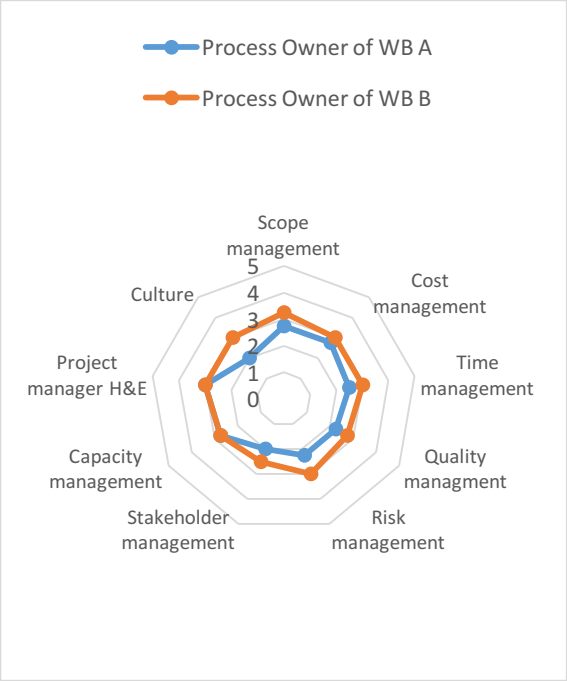

Figure 26: Cross analysis of KPI levels of the process owners

Figure 27: Cross analysis of Maturity Perspective levels of the process owners

Both the process owner results indicated a higher level of maturity than their regular projects. The interview of the process owner of WB A indicated that some knowledge areas do not have prescribed standards for all projects, indicating the lower score that can be seen in Figure 26. But both process owners mentioned during the interview that they are implementing the different structures of HWBP into the organisation. They both are working on a project categorisation system, to tailor processes and knowledge areas to the context of the project. This would indicate a level 4 in Standard processes Maturity Perspective, however as can be seen in Figure 27 the organisation is neither on this level according to their interviews nor according to their self-test results. The tested regular projects follow processes and methods that seem useful by the project manager and team to use for the project. Eventually, the plans for projects need to be accepted by the board in both Water Boards, so it should have a certain level of professionalism and transparency, in order to be able to progress. Then the board's explicit focus for all projects is should be on scope, time and cost management. This is also a reason for higher score for KPI levels in these knowledge areas for all regular projects, as can be seen in Figure 28. Remaining within budget limits is for the board the biggest priority according to interviewees of both Water Boards. The process owner of WB B and head of projects of WB A did not

deem it necessary to control budget for every project. Projects should be managed on a programme level. This way they would have better capability in guiding the capacity in the IPM construct and to be able to make better budgets estimations according to the interviewees A and E. Also controlling budget for every project becomes less important in a different organisational setup and IPM teams, such as in the HWBP project. This could be the case for HWBP projects, but for tested regular projects decisions they were still made by the project manager and there was not comparable organisational control to prevent scope changes within the budget limits set by the board.

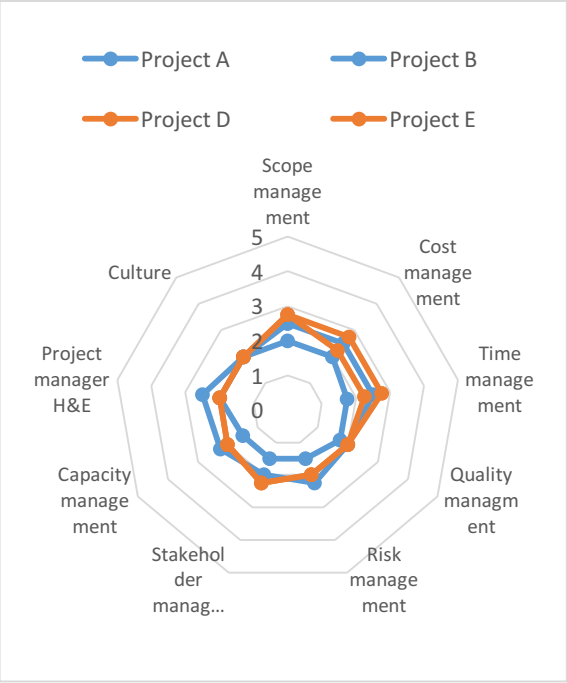

Figure 28: KPI level for all regular projects

Figure 29: Maturity Perspective levels for all regular projects

An explicit focus on other knowledge areas could benefit situations in the regular project such as for the project of WB A Project A for example. It might have created awareness for identifying and managing stakeholders. However, it could also bring more unnecessary processes for smaller projects. This should be avoided and this would be possible if there was categorization in use of the tools and processes according to a project need. But it can also be helpful to have adjustable project management tools, especially for larger projects, according to HWBP manager project control WB B. However, for that to happen an organisation needs to have similar processes and tools overall to be able to adjust. But there is no cohesion between levels process standards Maturity Perspective levels in the Water Boards and most interviews indicated a level lower than 3, indicating no standard use of processes in general.

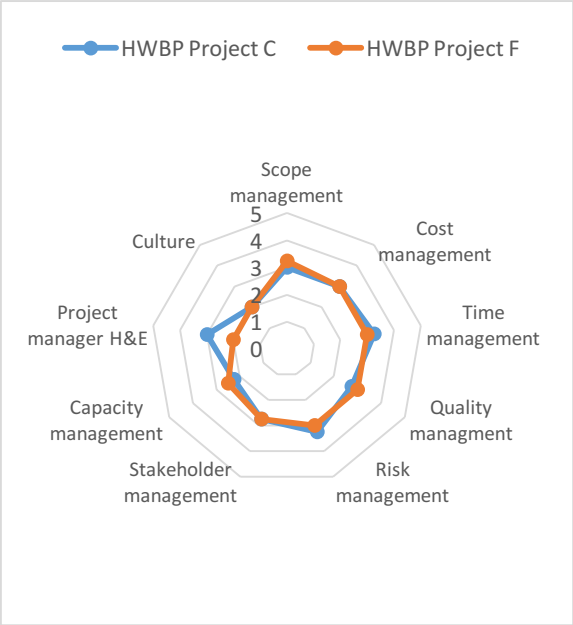

Figure 30: KPI levels of HWBP projects

Figure 31: Maturity Perspective levels of HWBP projects

As shown in Figure 30, KPI's of the knowledge areas are generally higher than that of the process owner indications as seen in Figure 26. HWBP has had a large influence on the processes in both Water Boards at different levels. Both the HWBP stakeholder management description in the project handbooks of the Water Boards were not enough detailed. For the HWBP project of WB B, all the descriptions of the knowledge areas were not at all detailed at that time. They used for that purpose the HWBP process book, instead of their own, or developed their own method to get a good indication of and how to further proceed to manage a more profound process. HWPB has also improved on different tools and adjusted them to their need. Such was the case in HWBP project of WB A, in which planning and risks were combined in one project management tool. Now there still is a large difference between levels of the Maturity Perspective Standard Processes of the regular projects that of the HWBP, as illustrated in Figure 30 and 31.

There is not only a difference in Maturity Perspective Standard Processes level, but in Maturity Perspective Interrelationship Organisation and departments in all projects as well. Reports are made to communicate to the organisation and the pace in which it is communicated differs between the HWBP projects and regular projects. The amount of involvement has to do with the complexity of the projects, however keeping consistency in reports and controlling them seems to be relevant to keep the other departments or organisation involved in the progress. The interviews and self-tests indicated that the systems, providing process information about the projects, need to be updated more frequently in order to give reliable information.

Having consistency in progress and evaluations could be beneficial to projects overall, when organisations want to be able to learn from their past experiences in the project. In both study cases it was not known by the interviewees what happened to the information of the evaluations. Two interviewees of the WB A indicated in their self-test that if the organisation would benefit from analysing the evaluations and give feedback, they would be able to improve projects. Overall, evaluations are done more structurally in HWBP projects than in the regular projects in both Water Boards, but since the HWBP project of WB A is still in an early phase, it was too early to say if audits would be applied. That is why they are indicated on a lower level in Lessons Learned Maturity Perspective illustrated in

Figure 31. Generally, both Water Boards believe they have to improve in structurally learning lessons of past experiences in projects. However, according to two interviewees, project departments and board need to start analysing different data gained from evaluations to give feedback or to adjust project management processes.

According to the process manager of WB B Lessons learned do not only depend on forms and evaluations. They also depend on effectively putting the right people with experience on the right spot according to Interviewee But if it is not done strategically by the organisation, knowledge, experiences and innovations such as IPM completely rely on the people that have worked or are working in the IPM projects according to interviewee I. WB B are still accustomed to work as integrated project managers and there is no direction from the board or departments of how the organisation should be structured in order to facilitate IPM. This should be different because IPM has influence on all departments, from maintenance to communication departments.

The HWBP project interviews indicated that the maintenance department is involved at an early phase of the project in the team. As indicated by Bakker & Kleijn (2014) early involvement contributes to success of projects overall. In the regular projects the different project departments were less involved at the time. However apparently, the merger of project departments at the WB B and the increased involvement in the different phases of the projects influences the availability of roles or managers for projects overall. According to interviewees of WB B, they do not have enough people available for all their projects. It is not known whether the WB A is experiencing similar problems.

The Human Resource department of WB A is keeping track of the progress and development of the project manager's competences. This too ensures the capability to work in the projects. However, there is not much proof of whether they are using HR knowledge explicitly and actively manage project managers in the projects. According to the interviews, managers know the competences of their employees implicitly. In both the Water Boards the principals select the people for projects in dialogue with the project manager and head of the department. Project managers are being categorized to see if they fit the criteria to work in the project and look at results and experience of previous projects. They check if people are available for the projects through their system and HR keeps track of how many hours they spend monthly in the projects. The process owner at the WB B stated that they started to actively check what the competences are of the project managers and of those who want to participate in a project. At the time of the projects at hand, they got a notice whether the project managers were interested and the selection is mostly based on mouth-to-mouth advertisement. The question is if it is really needed to select people any other way. Recording and having knowledge about project team members could help in new and unknown situations. One example is at the beginning of the HWBP project F of WB B. It may have helped knowing the competences of team members to see if they fitted the IPM role according to Interviewee I. Also, due to the resignation of the Head of Projects of the WB A, who was normally involved in the selection of people for projects, the knowledge of past experiences with project managers is possibly evaporated. Selection of the people now depends partly on the knowledge of his successor, the people he or she works/worked with and the information available about employees. Interviewee F mentioned that the Maturity Perspective only mentioned the project manager, however roles due to IPM are just as important. Especially, when the organisation of WB B wants to tailor IPM to regular projects as well.

Both organisations have put effort in training their project managers. Many of the project managers are IPMA educated. They have a budget that is created to spend over the course of five years. This

way the departments and organisation can conclude if people are interested to further explore and educate themselves. There is a difference in Maturity Perspective Project manager Development level, because HWBP offers more education for people that work on their project, giving training in system engineering for example.

The final comparison in Maturity Perspectives is responsibility and success. The WB A process owners regarded the success as something that should be shared and celebrated amongst members of the team. One of interviewees responded in the self-test that successes or progress was not shared amongst colleagues in the WB A except for his own team. It was his wish to share this frequently amongst colleagues. The other process owner of WB B believes in the integration and sharing of successes and progress, creating a culture that focusses on contributing to the goals of the organisation and departments and not on the projects individually. Interviewees believed that this is already shared sufficiently within the organisation. In both study cases the model did not indicate the nuances in levels well enough to indicate level of maturity of this perspective properly.

Generally, interviewees have the ambition to improve in the Maturity Perspectives. They want to increase the maturity of structural processes and have adaptable tools and learning inside the organisation. Improving the project managers and testing their competences, not limited to the project managers, but those in the different roles as well. Interrelating and cooperation between and by departments within the organisation can be better and the respondents have the ambition to do so. The program overseeing the different processes and knowledge areas of the projects need to be improved in both organisations. The responsibility of the project managers and team at that level of maturity is sufficient. The WB A would like more sharing of success and WB B generally believe it is at an acceptable level.

7 Conclusion of the analyses & model review

In paragraph 7.1 the overall level of maturity of the organisation will be given with an explanation. The differences between HWBP and regular projects will be explained in paragraph 7.2. With this information, the model is reviewed in paragraph 7.3. The chapter ends with an answer to sub-question 2 in paragraph 7.4.

7.1 Maturity Perspective levels of the Water Board organisations

For this research, it is the goal to get an indication what makes the Dutch Water Boards organisations mature in their project management. In this process an indication is given on how mature the organisations are on the several maturity aspects. The level of the Maturity Perspectives of both the Water Board organisations is shown in Figure 32. The conclusion of Maturity Perspective levels is based on all case-study results.

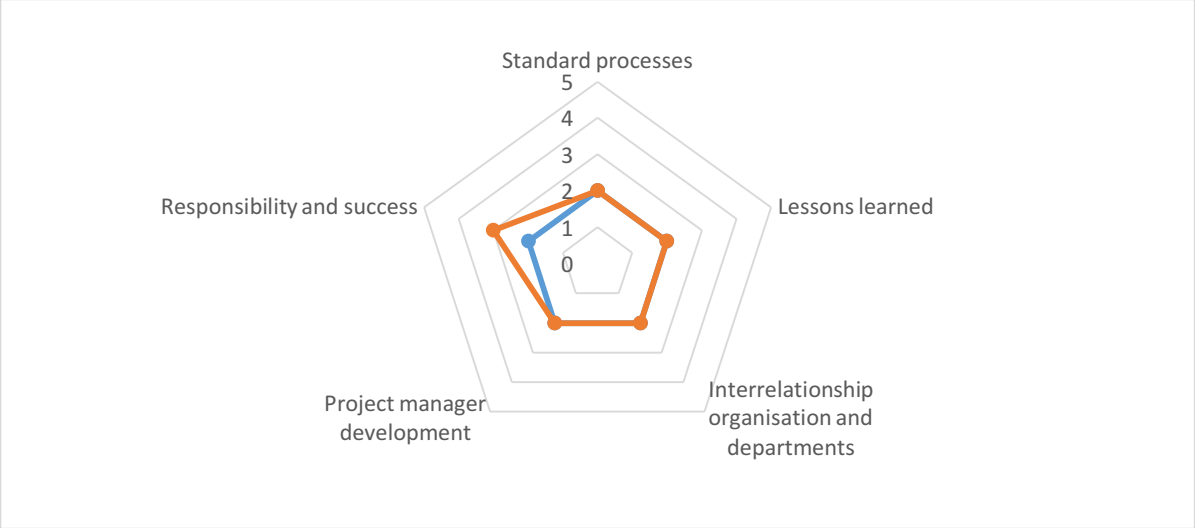

Figure 32: Maturity Perspective Levels of the Water Board organisations

As can be seen in Figure 32, both Water Board organisations' Maturity Perspective Standard processes are indicated on level 2. The reason is that there are many differences between the projects in project management tools, standards and use of knowledge areas. The larges differences were seen between the HWBP projects and regular projects. In general, there is no indication of control if all processes and tools are followed in every project. Both organisations use a process handbook for all their projects, but according to the case studies they lack descriptions and were sometimes without any coordination changed to fit the projects. Making the description for level 3 'one process standard' does not seem an appropriate indication for the Water Boards.

Lessons learned Maturity Perspective is indicated on level 2 for both organisations. The evaluations' frequency differs and these are not structurally discussed or analysed by departments or board with the aim to learn lessons for future projects. Also in this Perspective there are differences between HWBP and regular project. Nonetheless, the score fits the level of the whole organisation.

Interrelationship organisation and departments Maturity Perspective is also indicated on level 2. The reason is that the organisations and departments involvement differ per project, not giving a clear indication on level. Also, the overview tools for all projects are mostly orientated on budget and time

of project. According to the case studies they do not function properly or are not updated frequently on project processes.

Project manager development Maturity Perspective level is indicated on level 2. The project manager is hired and placed based on previous projects and experiences. The process managers both claim that project manager's competences play an important role in hiring and placing them. This is not recognized by the six other interviewees, which could indicate an implicit use of competences for placement. Education is encouraged by the organisation by giving personal budgets to the project managers to spend on courses. Nonetheless, courses can be chosen freely and there is not an established line between personal status and development of project managers. There are also differences in education, depending on projects where the project managers are involved in.

In both organisations, responsibility is indicated on level 2, which indicates that the project manager and team is held responsible. There is a difference in success between the organisations. WB A is indicated on level 2 for success and WB B is indicated on level 3. The reason why the level of WB B is higher is because it depends on the type of project and there is acknowledgement throughout the organisation for bigger projects. However, as discussed before the level indication needs more granulation to give a better indication.

7.2 HWBP project differences & influences

During the case-studies in both the Water Boards it was indicated that HWBP is more mature than the tested regular projects in several Maturity Perspectives. It is more mature in Standard processes, Interrelation organisation and departments and in some aspects, also in project manager Development. With this being said, it should be taken into account that, due to the size and complexities of HWBP projects, aspects e.g. explicit focus on knowledge areas and more involvement require more attention in order to successfully manage HWBP projects. As indicated by the model by Westerveld (2003), in which importance of certain aspects to manage projects in, depends on the size, complexity and context of the project.

Nonetheless, many of the aspects of HWBP can also benefit the organisation to improve the organisations overall maturity. HWBP can be seen as a project management maturity increasing opportunity and both organisations use the HWBP projects as reference to make their organisation more mature. But according to the results of the study-cases, they have not yet adapted most of their maturity increasing aspects in their organisation. This created many differences in both the organisations between management of HWBP projects and regular projects. The differences are indicated in the table on the next page.

HWBP projects	Regular projects
Managed by RWS and Water Board	Managed by Water Board
IPM team and distribution in roles	Integral project manager and team of specialists
Structured evaluations	Occasional evaluations
Process control by IPM construct, principal meetings and progress reports	Process control by process reports and principal meetings
Frequent meetings with the board as principal	Meetings with the board are less frequent
More explicit use of the complete project management processes	More implicit use of project management processes
Various project departments are early involved and continuously	Other project departments involvement occasionally

Table 4: Differences between HWBP and regular project of the Water Boards

It not only demonstrates a split in project management organisation in the Water Boards, but it also shows that maturity increasing influences have effect on more than only the project management level alone as is indicated in Figure 33.

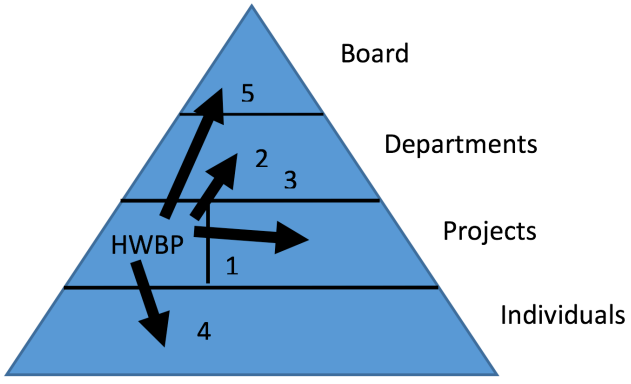

Figure 33: HWBP influences

1. Methodologies and processes of the regular projects are being adapted from lessons of HWBP to fit in their context;
2. Integration and collaboration of different project departments during projects;
3. HWBP has influence on the distribution of capacity due to changes in roles of integral project managers and the integration of the different project departments in the HWBP project, stressing structures of the supporting departments;
4. Changing from integral project manager to managers of roles;
5. Participation of the board as principal and integral member with a distinct role.

Besides the differences there are similarities between HWBP projects and the regular projects:

1. The selection of project managers and IPM roles are done in the same way;
2. Learning from the projects;
3. The board is involved in controlling and managing the budget by application of forms and amendments for all projects.

The first point indicates that the selection of managers for the projects is done the same way in both types of projects. They both depend on knowledge and experiences of the head of the department.

As for the second point, the HWBP projects are more frequently audited and evaluated than the regular projects. Nonetheless, the maturity indication of the organisation in paragraph 7.1 demonstrates that there is a same level of Lessons learned Maturity Perspective.

With the third point is meant that the board is controlling the budget of every project. According to interviewees A and F this needs to change in order to place manager more efficient and control the budget more accurately. With introduction controlling factor of the IPM construct and 'Deelprogramma' management, board's involvement in every project in this way is becoming less relevant.

7.3 Model review

HWBP projects have a large impact on the project management of both Water Boards as can be seen in Figure 33 in paragraph 7.2. They are used as an example to learn from and both organisations are trying to implement the way of management to other projects in the organisation. Conclusions drawn from the case studies have shown that there are differences between the HWBP projects and the regular projects in the organisation. These differences are in Maturity Perspectives, but also in aspects like team organisation structures or involvement of departments, as shown in table 4 of paragraph 7.2. In order to implement HWBP lessons and level the differences, it requires adaptability of the organisation in order to function better, according to some interviewees. IPM for example, could benefit from the board's decision to allocate budget per programme, instead of per project, according to interviewee A. It also requires coordination by the organisation. The implementation of learned lessons of HWBP depend on the people that have the experience to implement this in other projects at WB B. Also, as the self-tests of WB A explained, in order to learn from evaluations, they lack meta-analyses and coordinated sharing. These are examples that show that coordination by the organisation is needed to increase maturity.

The HWBP projects are seen as a maturity enabling opportunity not only at project level, but also on a higher level. In other words, it may contribute to the improvement of the overall project management capabilities resulting in a more mature organisation. Thereto, the organisation needs to adapt parts of its organisation structure and methods in order to facilitate project management of HWBP fully and to become more mature. It also needs guidance from a more tactical or strategic level in order to be properly implemented into the organisation. The used maturity model is solely project orientated, hence disregarding any broader context that may be of influence on its maturity, making it less relevant for the Water Boards to test maturity in. So the broader context should be included in de model to establish the maturity of the Water Boards.

When focussing on a broader context of the organisation, i.e. including adaptability of the organisation and alignment to project management, the organisation becomes more interrelated. The

interrelationship of the organisation and departments as a Maturity Perspective is too limited to test maturity accordingly. So it needs to be included in the measuring of Maturity Perspectives and when added as a dimension it creates an indication of interrelation of the different parts of the organisation and with it maturity of the Water Board organisation.

7.4 Answering sub-question 2

With the results obtained from the case studies a conclusion can be drawn to give answer to: *"What makes the organisation of the Dutch Water Boards mature in project management?"*

The first model studies have shown large differences in project management in HWBP projects and regular projects in both the Water Board organisations. The organisations are implementing the different maturity increasing features derived from HWBP. However, it came to light, in order to be able to render the different aspects that HWBP brings, that different levels in the organisation other than that of project management need to get aligned with maturity improving features. The more the organisation is interrelated to project management, the more the organisation is able to adapt to these changes construct and thus is becoming mature. This should not be limited to adapt to project management changes that HWBP brings into project management, but also to future changes. This leads to the answer to the question *"What makes project management organisation of the Dutch Water Boards mature?"*

"The degree in which the Water Board is able to create interrelation of the organisation with project management, to allow changing structures aimed to improve project management."

PART III / FINAL MODEL

Table 5: Water Board Project Management Maturity Model

8 Water Board Project Management Maturity Model

With new insights gained from the conclusion and re-evaluation, the maturity model is adapted. The model can be seen in table 5 in the folded paper on the left side and located in Appendix F. The model is in Dutch, making it practical for the Water Boards to use it, however the changes and functioning of the model is further explained. A simplified illustration of the model is given in Figure 35.

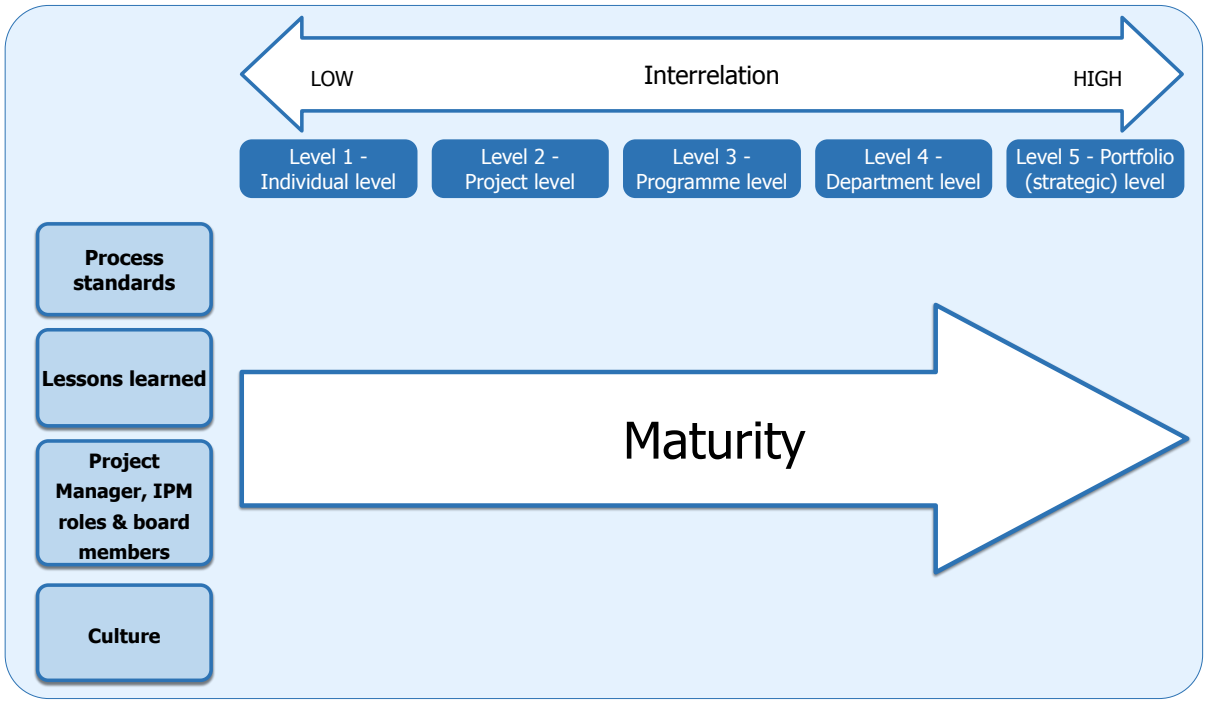

Figure 34: Illustration of the new model

8.1 Level description

The Interrelation organisation and departments Maturity Perspectives is removed as a Maturity Perspective and is added as a dimension in measuring maturity in the X-Axis. The higher the maturity the higher the governance and departments are interrelated to project management and their projects. The more the organisation is receptive to change in the project management.

The levels go from Individual, Project, Programme, Departments and Strategic as shown in Figure 66. The different levels have been chosen after observing what changes in project management, such as that of HWBP, can have on the Water Board organisation. Growth of levels is reached when the organisation is more interrelated and it has improved capability to adapt to changes in project management.

8.1.1 Level 1 – Individual level

Level 1 indicates that the projects only rely on the capability of personnel, without any coordination from the governance, departments or in the team itself. Basically, there is no oversight in the organisation in project management, no interrelation and project management is seen as one of the functions in the organisation. Due to that there is no oversight instruments, the board has to be manually involved in every project in order to maintain control.

8.1.2 Level 2 – Project level

This level means that there is more coordination in the organisation, though differences between projects are still large. Project managers and team choose their own techniques. There are basic processes that are set out by the organisation and need to be followed, causing oversaturated mandatory processes for simple projects and there is too little prescribed for large projects. The organisation and departments are perceptive of the capabilities of their project management personnel; however, they are not using that actively. The different project departments operate stand-alone and information is send from one department to another. Coordination inside the organisations varies and supporting departments have only an advisory role. The Board keeps mainly budget control in the projects.

8.1.3 Level 3 – Programme level

In this level project management processes are designed specifically for projects in a certain programme or category, creating less unnecessary work in projects. Management of projects and used systems are corresponding. Project departments and supporting departments work together in different phases of the projects, but not continuously. The capability of project management personnel is known, recorded and used for placing personnel in projects or educational purposes. The board controls projects on a programme level.

8.1.4 Level 4 – Department level

Level 4 indicates that the project and supporting departments work seamless in projects, e.g., the project management systems and processes correspond with that of the departments. Project management developments and lessons are analysed and well-coordinated throughout the organisation in order to maintain growth in development in project management. The capabilities of project management personnel are known and are being kept track of. The organisation focusses on the capabilities of their project management personnel on individual level. The board allows the departments to manage their own projects.

8.1.5 Level 5 – Portfolio (strategic) level

In this level, the system of the board is in complete correspondence with that of the projects. This does not mean that the board is managing and/or has to be involved in every project. Due to the seamless organisational setup with that of project management overview is created. This gives the organisation the capability to react to changes in projects, due to high coordination capabilities and similar language. This does not mean that the board is not involved in projects at all. The principal function of the board is very useful in projects such as HWBP. Knowledge and developments in project management are incorporated throughout the organisation. On this level the organisation is completely interrelated with the project management.

8.2 Maturity Perspectives

Process standards, Lessons learned, Project Manager & IPM Roles and Culture are the adapted Maturity Perspectives from the first model and these are located on the Y-axis. They have been divided in Sub-Maturity Perspectives to create more granularity for measuring maturity. Some of them are overlapping, but that division is deliberately created to provide more information. The newly adapted Maturity Perspectives will be explained in the next paragraph.

8.2.1 Process standards

Organisational standards

It tests the level of organisational standards that are implemented in the organisation. The lowest level indicates that there are no project management standard processes followed in projects. The higher the level, the higher the adaptability to the standards. The highest level indicates that governance structure adapts to project management processes structures in order to support their projects.

System, techniques and methodologies

This part checks the interrelation of corresponding systems, techniques and mythologies in the organisation, to create a better and an efficient way in communication between projects and other parts of the organisation. The higher the maturity level, the better the interrelation is with project management in the organisation.

Central systems

Central systems, checks if the systems that carry important information, such as project milestones, budgets, risks and other important information are up to date. The higher the level of maturity is in this sub-Maturity Perspective, the more information is kept up to date and interrelated with parts of the organisation.

8.2.2 Lessons learned

Lessons learned Maturity Perspective is an adapted version of Lessons learned in the preceding model and is referring to the quality of evaluations, audits and lessons and whether they are well coordinated in the organisation. The more mature, the more structure there is in coordination and analyses of lessons throughout the organisation, thus increasing the capability in becoming a learning organisation.

8.2.3 Project managers, IPM roles & board members

Experience

This sub-Maturity Perspective is concentrating on the recording capability of experiences of project managers, IPM roles and board members in past projects within the organisation. Furthermore, to what extent this knowledge is being used by the organisation. The higher the maturity the more is being recorded in the different levels of the organisation.

Competences

It tests in what degree the organisation is actively recording and managing competences of project managers, IPM roles and board members. Furthermore, if the organisation is actively using it and if the different layers in the organisation are cooperating well. The higher the maturity level, the more competences are measured and used strategically.

Education
The sub-Maturity Perspective education involves the level of education the organisation offers. The higher the level of maturity, the more knowledge is kept up to date on project management developments and is spread throughout the organisation.

Capacity management
This measures the coordination of capacity of project managers and IPM roles in projects. The higher maturity, the more systems are frequently updated and connected with other parts of the organisation.

8.2.4 Culture

This Maturity Perspective is divided into *Responsibility*, or who are the owners of the project result, and *Success*, to what extent it is shared. These are the same topics that were tested in the first model. Responsibility test the level of shared responsibility of the results of projects. Success is testing the level of sharing of success and information about projects in the organisation. The higher the level, the more information is shared.

9 Maturity level indication

This part reflects the information of the case studies and scores of the first model against the new model and are used to fill in the scores in the Maturity Perspectives. The level indication is not held against indicators, as was done in the first model. However, information gained from the case studies supply enough evidence to provide a level indication in the new model. Both Water Boards maturity levels are indicated in one model. For the reason that the both organisations scored the same level for the most part. There are differences but not significant enough to have distinguished maturity levels. The choices and essential information is mentioned to elaborate on the level scores. Figure 35 gives an illustration of the levels of maturity.

9.1 Maturity levels

Maturity Perspectives	*Sub-Perspective*	Level 1 - Individual level	Level 2 - Project level	Level 3 - Programme level	Level 4 - Department level	Level 5 - Portfolio (strategic) level
Process standards	*Organisational Standards*					
	System, techniques and methodologies					
	Central systems					
Lessons learned						
Project managers, IPM roles & board members	*Experience*					
	Competences					
	Education					
	Capacitity management					
Culture	*Responsibility*					
	Success					

Figure 35: Maturity level indication

The Maturity Perspective process standards is indicated on level 2 for all Sub-Perspectives. Organisational standards it is indicated on that level due to the fact at the time of their regular projects, use of project management standards could be partly or for the most part self-interpreted. As long it was according to the standards of the organisations to request budget for the project. For Systems, techniques and methodologies it is a similar situation. Use of them differs between the regular projects and that of HWBP projects. Wherein, HWBP projects remain very consistent use of them and occasionally adjust adapt them to their need. Regular projects are les constant, indicating level 2. With the updating of organisational systems, both organisations had problems with their reliability, resulting in a level 2 score for both organisations on Central systems. Lessons learned is indicated on level 2. Both the organisations evaluate most of the projects however, lessons are not structurally analysed. Project Managers, IPM roles & board members Maturity Perspective indicates level 2 for the main part. Experiences and competences Sub-Perspectives are indicated on level 2. Experiences of the project

management personnel are known to the Head of Projects, but not kept record of. Competences were tested once at WB A. However, there was no proof that these were used to place project managers in a project explicitly. At WB B there were no competence tests. Education budget is available and encouraged by the organisation. Nevertheless, it is basic and there is no proof of active support in getting new education for project managers. In both the organisations there are differences between the HWBP projects and their regular projects. Wherein, the HWBP offers additional courses. Due to the above mentioned, a level 2 score is given. Capacity management Sub-Perspective scored level 3. Overview of availability is kept track of in both organisations by HR departments and the head of projects work together to designate the project managers or roles in projects. The Culture Maturity Perspective indicates level 2 for the responsibility and projects are seen as a project manager and team endeavour. Success is indicated on level 2 for WB A, for the reason that it is not shared in the organisation. At WB B the successes, depending on the size of the project are shared in the organisation. Indicating level 3 for their organisation. The total of the scores lead to the answering of the final sub-question.

Answering sub-question 3

The level indication of the maturity model gives an answer to:

"What is the determined maturity level of the tested Water Boards in this thesis?"

The scores indicate that the organisations overall focus on Level 2 - Project level. Meaning that there are large differences in projects how they are managed and focus is to a large extent on a project-to-project basis.

PART IV / STATE OF MATURITY

10 Conclusion

There are several ways to improve project management. However, it is hard to know where to coordinate and to improve in. Project Management Maturity Models are a way to identifying the situation of the project management capabilities of an organisation and show a path for improvement. However, there is no general accepted model and they have different perspectives on maturity. To understand what important factors are to improve project management in for the Dutch Water Board organisation, the model needs to be built applicable to its context. This thesis presents a maturity model that is derived from different existing models and adapted to the context of the tested Water Board organisations. Therefore, this model will help answer the question: *"What is the state of maturity of the project management organisation of the Dutch Water Boards?"*

10.1 Model development

The first sub-question that is to be answered for this research is: *"What are the important factors to include in the Project Management Maturity Model and to test the Project management organisation of the Water Board, in order to measure their maturity?"*

To get an indication of the important factors to increase project management capabilities in general and to increase the chances of project success, the literature about project management factors have been studied in paragraph 2.2. These topics were overlapping with three analysed maturity models of sub-paragraph 2.3.4. To come to the following topics or Maturity Perspectives in the model relevant to test maturity on:

- **Standard processes:** indicating adapting ability of standardised tools, methodologies and standards for projects.
- **Lessons learned**: testing if an organisation is collecting the different evaluations and audits of past project experiences to increase capabilities in project management for the next project.
- **Interrelationship organisation and departments:** focussing on the level of integration and alignment of organisation and departments.
- **Project manager development:** testing the level of organisational awareness of personnel capabilities and training provision.
- **Responsibility and success:** to indicate the project management awareness of the organisation and sharing culture.

For the model, it is key to make it context specific. Therefore, it was necessary to get a better understanding of the organisation, and hence a preliminary research in Chapter 3 has been conducted to understand contextual factors of the organisation. This gave insight to test their process manager, regular projects and HWBP on the different knowledge areas, to get a maturity indication from different perspectives of the organisation and to rate it's overall maturity.

To create overview in gradation of maturity, a five level rating system was constructed in the model to make a comparable structure that tests the Maturity Perspectives. To get a level indication, information was gained with the use of semi-open interviews and self-tests. These were factors seen as important to test the first model on and to get an understanding what project management maturity is for the Water Board organisations. However, to get a better understanding of the maturity for the Water Board, the model needs to be revaluated after testing.

10.2 Model revaluation

From the single-case and cross-case analyses it became evident that, based on the evidence presented during the interviews and self-tests, the tested Water Boards scored level 2 for most of the Maturity Perspectives in the first model. This level was indicated mostly since HWBP projects of both the Water Boards have a higher maturity level compared to their regular projects, which creates a lower level indication of the organisation overall on Maturity Perspectives.

WB A and WB B are trying to implement the maturity increasing features that HWBP brings into the organisation. However, to facilitate the project management, parts of the organisation, need to coordinate and adapt. HWBP is a maturity-increasing example that shows that, to be able to increase in project management maturity, stretches further than project management alone. This plays a role in a larger part of the organisation. The ability to further enhance their project management capabilities depends on the interrelation of the organisation to project management. To become mature is enabling adaptability in the surrounding organisational structures. Concluding with a maturity definition for the Water Boards and answering the sub-question: *"What makes the organisation of the Dutch Water Boards mature in project management?"*

"The degree in which the Water Board is able to create interrelation of the organisation with project management, to allow changing structures aimed to improve project management."

These new insights, gave reason for adaption of the model. Instead of testing the Interrelation Organisation and Departments as a Maturity Perspective it becomes a way to measure Maturity as a dimension.

10.3 Final Model

The maturity model levels have been adapted to fit the modified perspective on maturity. The higher the level of maturity, the more interrelated the organisation is to its project management. The levels that the maturity of the Water Boards are indicated on are:

Level 1 –Individual level
On this level the projects rely on the capability of the project personnel. The organisation sees it as one of their functions and there are no interrelations with projects or project management. Departments are standalone and the board is manually involved in all projects.

Level 2 – Project level
On this level there is more coordination and interrelation, however there are differences in management between projects. The interrelation with departments is generally advising and the board controls every project on budget.

Level 3 – Programme level
The project management processes are specifically designed and specified for projects in a specific programme or category. This creates less unwanted processes. The project and supporting departments collaborate in different phases of the project. The board controls the projects on programme level.

Level 4 – Department level
The project and supporting departments cooperate seamless in projects. All project management systems and processes of the departments are aligned. The board allows the departments to manage their own projects.
Level 5 – Portfolio (strategic) level
The whole system of the organisation is interrelated. This creates the capability for the organisation to react to changes in projects, due to the high coordination capabilities and similar language. The board manages projects on a strategic level.

The model tests the levels on four different Maturity Perspectives, without the Maturity Perspective Interrelation organisation and departments, since that is integrated in the model as a dimension. The Maturity Perspectives topics are kept the same, however they have been adapted to the new maturity levels and are better fitted to the context of the Water Board. The Final Maturity Perspectives are: **Process standards, Lessons learned, Project managers, IPM roles & board members, and Culture.**

The results of the case studies and score indications of the first model, have been revaluated and put against the adapted model. Both the organisations have differences, but generally the level indicated that the organisations manage differently per project and answers the third sub-question: *"What is the determined maturity level of the tested Water Boards in this thesis?".*

The determined maturity level of both of the Water Boards is indicated on **Level 2 – Project level.** The level shows differences in projects how they are managed and the focus is for a large part on a project-to-project basis.

10.4 State of maturity

The answers to the three sub-questions lead to the answering of the main research question: "*What is the state of maturity of the project management organisation of the Dutch Water Boards?*"

With the obtained perspectives on maturity, found on the basis of theory and context of the Water Boards, an indication of the level of maturity is acquired for both of the organisations. The two organisations are both on their way in implementing the different incentives that HWBP brings to help further improve project management capabilities and to customise them for their own projects. However, to be in the state of fully being able to implement HWBP and other project management improvements, the organisations need to be capable in coordinating and aligning their structures. This is not yet the case. For this reason, the state of maturity of the WB A and WB B is not yet mature.

11 Recommendations to improve maturity

The optimal level of maturity according to this study for the Water Boards would be, Level 5 – Portfolio (strategic) level. However, reaching the highest level of maturity for an organisation, without taking the added value into consideration would be unwise (Backlund, 2015). There are no organisations that have reached the highest level of maturity in the past (Meisner, 2007) and it is not expected that the Water Board organisations would be in a different position. However, the organisation should not settle for less in improving their organisation, as they should strive for perfection. To reach the highest level of maturity, an organisation should be in the best position to reach is business objectives (Andersen & Jessen, 2003), which are for the largest part the projects in the Water Board organisation. To be more applicable to the situation of the Water Board organisations now, improvement suggestions will be given according to the Maturity Perspectives of the final model.

11.1 Process standards

Both Water Boards are implementing project management standards, team setups, and techniques in order further improve their project management capabilities. However, it is not recommended to copy the exact same way in managing all their projects. Projects indifferent of context and sizes, need other ways in levels of control and use of project tools (Westerveld, 2013). Also, the success of projects depends for a large part on the capabilities of the project management personnel (van Aken, 2009) However, control is needed to ensure quality of the project (Hällgren, Lindahl, Thomas, George, & Buckle Henning, 2012). It would be suggested to indicate per project what the e.g., processes and project management tools are. To enable this the Water Board organisations should have a quality manager that evaluates the project types and assess the level of control in e.g., standards, methodologies, that are needed in order to categorize processes per project. It could benefit from unknown situations in larger projects and to have a strong basis to start from. But also for smaller projects avoidance of excessive use of processes is necessary. Categorizing the IPM construct for regular projects would also be an advantage for the organisation. IPM teams do not need to be fully unfolded on every project. Both organisations are looking for a way to implement the IPM concept into their regular projects. Having the similar setups of teams would not create divisions capacity management. But the most important part to integrate and learned from HWBP is the structured way in managing projects and the way communicating in projects is organised. To decrease the differences and increase the organisation's maturity level is to use the same frequently updated systems, reports to communicate amongst projects, but also amongst departments and board. Creating a common language and interrelate the remainder of the organisation with the projects and project management.

11.2 Lessons learned

In order to improve Lessons learned in the organisation, the organisations should not only coordinate evaluations for each project, but also analyse them to be able to learn from them. The evaluations should not be seen as documentation, but they should be actively used and analysed by programme managers or departments in order to learn from them. Not only do these lessons need to be coordinated better and more structured, the analysed information should also be more accessible for project managers to learn from similar situations for their own projects. With the analysed information, a quality manager, should get an indication of what can be adapted in project management processes or methods.

11.3 Project managers, IPM roles & board members

The roles and managers are now chosen by the head of projects on the basis of personal knowledge of project history. Personnel's capabilities were not registered according to the interviews and were dependent on knowledge of department managers. In order to advance the competences of personnel should be measured by HR and audits of project personnel's performance should be collected. WB A has evaluated the competences once however, it is not known that this is being used actively to place people into projects. WB B should get an indication of the different competences and start to add to the database of working personal. Because it is important to know what the capabilities of personnel are when an organisation is counting on them. This way organisations can coordinate people with the right competences into unknown situations, in which they depend more on personnel than on structures. By registering competences, HR can also monitor what the strengths and weaknesses are. Also, education can be made more applicable to a person's needs, steering the personal budget more efficiently. At the moment, there is no coordination in education in both WB A and WB B.

11.4 Culture

When an organisation is becoming more integrated and the project would be better managed on a programme level, as is the wish of both former process owners of WB A and WB B, higher echelons in the organisation will feel responsible achieving the goals of projects. WB A project information and acknowledgement is only shared amongst team members. The information about any project should be shared on an intranet, to involve different projects, departments and board with the projects. Creating more affinity with the projects. This was also indicated as the ambition by most of the interviewees at WB A. For WB B, the sharing of project results depends on the size of the project, but it is shared on the intranet. WB B is ranked higher in maturity on this aspect, but the type of project should not matter. To create interrelation, it is important that all projects matter and form part of the bigger goals of the organisation.

12 Discussion

This chapter will discuss the research findings, followed by addressing the different limitations of research. Finally, the recommendations for future research will be presented in the last paragraph.

12.1 Reflection

At the end of the research, it is important to look back what it is that has been learned from this process and what is produced at the end. The study started off getting an indication of the maturity of their project management. After analyses, it became apparent that a process and project view on most maturity models is too narrow. When observing project management in an organisation wherein projects are a large part of the organisations, it is important to look at it to from the entire context.

As a product for WB A and WB B, the model has given an indication of the levels of maturity on the several Maturity Perspectives. The results should not only create awareness on problems and to create incentive to increase their maturity, it can also be used as benchmarking tool to communicate between the different Water Board organisations. If the goal is to further professionalise, as WB A advocated, communicating about the differences and comparisons between the Water Boards, could help in this process.

However, the model is made on the basis of different insights from literature and one preliminary interview. This was then tested at the two different Water Boards and the adapted model was designed from the results of the case-studies. The question remains, what is the use of the model for the tested and other Water Board organisations? The fact is that it is only tested on two Water Boards, does not validate it as a general maturity model applicable to all Water Boards. However, it is known that Water Boards use similar structures and they are involved in similar projects. As most of the Water Boards are also involved in HWBP projects, it creates an opportunity to spread similar influences into the organisation. The model could be used to identify comparative levels of maturity and to gain insight in the different organisations, to show what the different Water Boards do in order to reach a certain level of maturity.

However, the other question that remains is what does this research contribute for the scientific literature? This qualitative research contributes to new insight and perspective on maturity models. It verifies that a maturity model should go beyond the testing of project processes only. Also, it shows that the context of the organisation is important in order to test maturity. Leaving context out of maturity testing and having prescribed processes makes it hard to identify the actual maturity for an organisation.

12.2 Limitations

- By using the five level system, situations get equalized and oversaturated in order to get a level indication. This was used to get good comparability, but more granularity in levels could bring a better and more refined answer.
- Not all project management maturity topics are used to test the water board on.
- The qualitative research, in which only two Water Boards have been tested, creates low external validity of the model. To know if the model is applicable to the situation of other Water Boards, more research is needed in order to validate it.
- The analysis of the maturity model examples is based on limited information. This is not meant to be a complete maturity model and it should be kept in mind that parts may be left out of the evaluation that might have influenced the image given in the thesis about the maturity models.
- There are many more project management maturity increasing components that have not been mentioned nor tested. Due to the time window, not all topics could be discussed.
- The advice and conclusions drawn have not taken into account the rules of a Public Principal. The organisation is bound to certain rules as Public Principal. This needs to be further explored, in order to draw conclusions on the flexibility of the role of the board and other departments.
- The advice leaves the costs of improvement and the related time it will take to implement out of the scope. It needs further research what tested improvements in different levels of the organisation would comprehend cost wise.
- The projects that have been assessed are different. Some have been finished, some were in the development phase. It is noted that both organisations already have become more mature in the intermediate time. In order get an accurate reading of the maturity of the organisation, different projects that are developed around the same time are needed to be analysed.
- Other projects of the Water Board may also have created an effect on the project management capabilities and contributed to improved maturity of the organisation.
- To get a more accurate reading, the amount of HWBP projects should be equal to that of the self-managed projects in each Water Board. It took considerable time in order to get contact and to organise interviews for this research. Leaving no time for further research.

12.3 Recommendations

- The projects that have been used for the research may be obsolete for the purpose of measuring the maturity levels, as the organisations are developing. For future research it is recommended to analyse projects that are being developed at the same time, this may provide a more accurate indication of the maturity level of the overall organisation.
- Find a balance between the control by the organisation and individual decisions in project management. This would contribute to making the maturity model more accurate in what is needed for the organisation to keep control in project management and learning to accept and rely on individual interpretations of various relevant project situations that may enhance maturity of the project organisation.
- The Maturity Perspective Success and Responsibility questions showed that there are different perspectives on project success. It is known that it strongly depends on the context of the project, however boundaries in time and budget seem to creep in projects while still reporting to be on time and within budget. Specifying or creating a common awareness on what success is in Water Boards would be interesting to explore.
- Testing the model on other Water Boards would make the model more relevant if the conclusions and adaption of the model also apply to other Water Board organisations.
- Testing more Water Board organisations on their maturity levels, could create a situation in which other Water Boards can compare levels of maturity against each other. This way the model could show the strengths and weaknesses for Water Boards to compare to each other and learn from.

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Appendix A: Maturity models

A1: MINCE 2

The Maturity INcerements IN Controlled Environments is an independent and open standard. However, for an assessment for an organization, assessors need to be involved against payment. It is created by the MINCE2 foundation and the model has been introduced in 2007. Is sees an organisation as *'the combination of people or companies, knowledge and funds, which is identified in society with the products and/or services that it produces and the routines and competences required in the context. Its function is: production of products and services squired by society and provision of an income for its participation' (Meisner 2007, P1).* The model looks at an organization at a holistic way, from six different perspective or towers. Each of those perspectives can reach level one until level five of maturity. Their definition of maturity is: '*the degree in which the organization is capable in effective and efficiently act on changes and circumstances'* (Meisner 2007) The model levels are actually based on EFQM (Meisner, 2007).

Level 1 – Activities: Individual orientated;

The projects are steered on the basis of personal experiences. In which the knowledge is not spread throughout the organisation. Processes are rarely available in writing. No quality goals set and it is a performance itself if a project is completed successfully. This level characterises itself in flexibility and creativity that is allowed in processes, due to that there are no processes set that need to be followed.

Level 2 – Processes: The processes are working accordingly, however, the link between organisation processes and project processes lacks;

There is awareness that processes lead to complete projects and people are worked according to these processes. In the processes there is some room for personal interpretation. The activities are well described and placed in an optimized order to predictable outcome of projects. However, there is no link between the organisation overall set of goals. All the people in the organisation have the same starting experience, due to the set entry experience level. Quality is known in the organisation, but there is no indication how to gain grip on it. There is no structural way to share the findings. Thus, the contribution of negative and positive experiences is supported, poorly.

Level 3 – Systems: there is cohesion and customization;

The activities and processes are in place in the organisation, in addition there are developed a set of standards. There is a feedback loop set in place by the organisation, in order to continuously update and improve processes and their means. Due to the fact that the means are in continues loop of improvement, they benefit from the organisation that invests in both the processes and systems. People that are hired need certain amounts of experience to be able adopt the systems. Lessons learned are spread amongst colleagues, because the organisation supports spreading of knowledge and intrinsic motivation. Quality inside the organisation is continuous improvement.

Level 4 – Supply Chain: There is customization, however it is not leading;

In this level there is focus on the interactions with the suppliers and customers in de chain. They have next to the control of their internal activities, processes and systems, interaction with other entities that are on the market. They are aware of their own strength in the market. All projects are in line with the long-term relationship. There is a focus on the bigger picture, not only on the prestige of one project.

Level 5 – Quality: the organization is leading and is followed.

The organisation sets trends and is a leading example for other organisations. It forms its own activities, processes, systems along the way. Adjusting its own capability level constantly, keeping its environment in constant consideration. The adaptions to the organisations are done with the help of external expert opinions constantly, enabling an organisation to grow.

The towers represent the focus of main aspects regarding the maturity level. The division in towers is as follows (Meisner, 2007):

I- People: Al that has to do with the organizations personnel and their capabilities inside the organisation;
II- Methods & Techniques: There is distribution and commitment of methods and techniques that are used during projects and organisation.
III- Customer: Influences that the client or customer organization has. Focussing on the quality of products that benefits the clients most;
IV- Realisation: the way the organization execute projects and operations in the organisation; with help of e.g., training of people, change of production line in order to benefit the realisation of the project. It is project orientated on de successful planning and executing and controlling of scope, budget, timespan and quality.
V- Knowledge: It is focussed on the learning ability of the organisation during the 'Realisation' of projects and programs. The organisation needs to have a learning mind-set, in order to be successful;
VI- Supporting services: This tower is about the way the management of the organisation, portfolio, programs and projects are involved and supported by the Supporting Services in facilitating and interconnecting them.

Figure 36: MINCE towers (Meisner, 2007)

All the towers are assessed on five criteria. The criteria are to deal with the perspectives of maturity of each tower and which strategy would apply best for the organisation. The criteria of the towers can create a relation or differences between towers, depending on content of criteria. The criteria are:

Criteria A: Leadership
Looking in much the organization is able and willing to fulfil leading positions. The higher maturity there is in this criteria, the higher leading status the organisation has and strategies will be followed without much discussion.

Criteria B: Staff
The Staff criteria checks how much the staff is capable and how the organisation handles its staff. The higher maturity for this criteria, the higher capable staff the organisation has to move forward.

Criteria C: Policy
It relates to the in the way that the organisation translates its vision and mission into practical daily routines for its employees. High maturity in this criterion means that the organisation has translated its vision and mission into an approach that can be used with e.g., costumers.

Criteria D: Means
This relates the Criteria Policy, Staff and Leadership in a practical view that an organisation has the means to do it. Relating to financial and non-financial aspects. Having high maturity in this criteria, entails that the organisation has the capability to fulfil.

Criteria E: Instructions
The way the organisation provides instructions in anticipation of business scenarios. These usually come in the form of methodologies such as Prince 2. The higher the maturity level in this criteria, the better the organisation can deal with particular situations.

The assessors measure an organization with the model is aimed at people's perspective and how they judge certain situations. If the maturity level of a certain perspective is known, they give people orientated advice of how to increase their maturity level in seven Action Flavors. The action Flavors are described to improve projects and suggest a project approach. The Action Flavors can be implemented at each of the six towers (book Mince):

AF1 – Quickening: increasing speed, in a way that changes along the way do not affect time;

AF2 – Broadening: Broadening the whole of a certain tower aspect;

AF3 – Deepening: Deepening in a way that it is more considered integral and support of change;

AF4 – Preservation: Making it more sustainable, for the future and use what is learned from the past;

AF5 – Tailoring: Particularize and tailoring the process of change to the audience that is part of the change;

AF6 – Interrelating: Connect all the people involved in the change process;

AF7 – Explicitation: Learning how to describe the goal, in a way that the people involved see the change process as an improvement.

The model has the largest effect if it is used on the entire organization. Also, there is a certification system in the model that helps the organization achieving overall maturity. The assessments are bronze, silver and gold, as they become more detailed in assessment techniques and outcome detail.

A2: Crawford's (2015) PMMM

The PMMM is made by PM solutions, a project management consultant firm. The model is based on the Project management Body of Knowledge's, fifth edition. It follows the ten knowledge area's that are specified by the PMI standard (Figure 36). The model determines the maturity of PM processes and a path in order to improve the organization's processes. It stresses the importance of a project management office. It is aimed that the organization culture is becoming mature.

There are five levels of maturity in this model (Crawford, 2015):

Level 1: Ad hoc processes and management awareness

Level 2: Structured Process and Standards. Use of them differs and based on the estimation of experts

Level 3: Organizational Standards, Institutionalized Process and organisational focus. There is an informal analysis of the project performances. Management focus is on institutionalising standards.

Level 4: Managed Process. The management mandates the use of the organisational standards and analysis of project performances. Management takes the whole organisation into account.

Level 5: Optimizing Process. Processes are continuously optimized by effective analysis of projects. Management focus is on constant improvement.

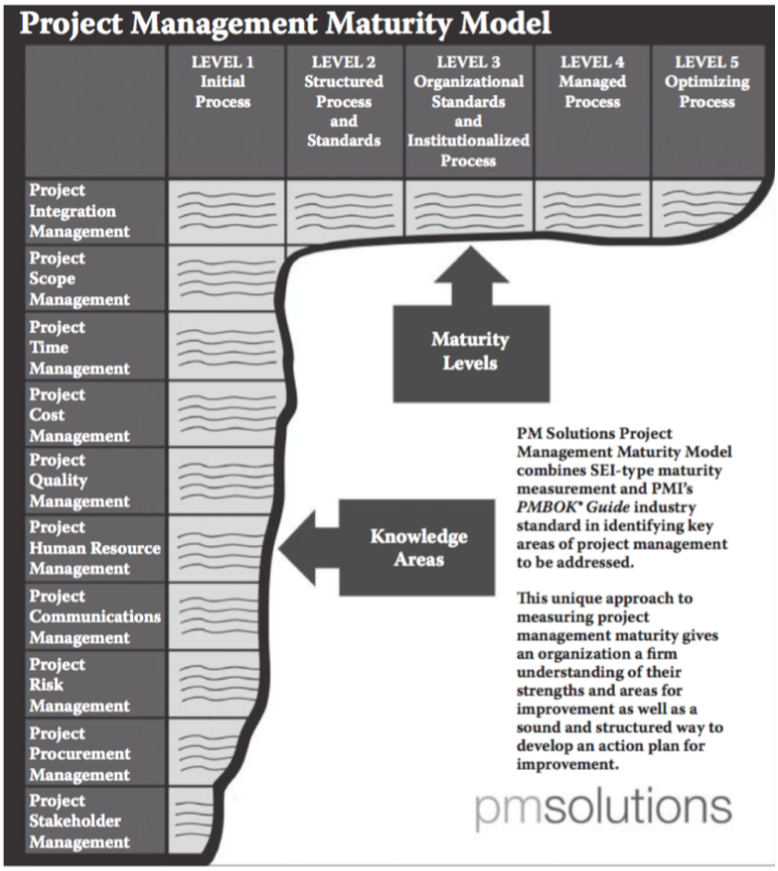

Figure 37: Model overview (Crawford, 2015)

The different knowledge areas are (PMI, 2014):

Project Integration Management:
Initiate the project. Coordinate project activities and integrate into a project management plan. Analyse and report changes during the project lifecycle and coordinate changes the other knowledge areas.

Project Scope Management
Processes all required that insure that a project includes all the work required, enabling the project it to complete successfully. Includes a detailed description of the projects and formalizing the deliverables, needed increasing the likelihood of meeting stakeholder requirements.

Project Time Management

Developing, executing and controlling of schedule for the project.

Project Cost Management

Developing, executing and controlling of budget for the project.

Project Quality management

Satisfying costumers in set requirements, making sure that the projects are fit for use. Setting out specific activities, practices and recourses that are relevant.

Project human resource management

Identifying right people with the right skill sets, documenting, and assign roles and responsibilities for the projects and teams.

Project Communication Management

Overall of overseeing of processes and data collection processes enabling for utilisation and decision making.

Project Risk Management

Identifying, controlling and mitigation of risks for the project.

Project Stakeholder management

Identifying, informing and managing stakeholders for the project

Project Procurement management

Planning and managing of contracts, purchases and acquisitions, conform to the constraints of the overall organisational structure and policies.

Further, the model pays special attention to three factors (PMI, 2014):

Project Management Office – This is the overseeing organ in serving the organization's Project management needs i.e. support services, project methodologies and standards, specialities, training, software tools.

Management oversight – If the changes of PM processes are implemented during projects.

Professional development – Project manager increase of competence, that is according to the book, a key in overall organizational performance.

A3: IPMA OCB (Delta)

The information obtained from the article of Pasian, Williams, Bushuyev, and Friedrich Wagner (2014). Because of the PMMMs originated from the field of quality management, where processes play a decisive role, most of them developed in process orientated models. However, the perspective on PM has developed as well. Pasian et al. (2014) mentions two drivers behind the development. One is the increasing requirements project management in global economy. The other is new insights on factors that contribute to PM success. Processes, tools and methods were further developed, in which the training of project managers is seen as a critical factor in gaining project success. Also the allocation of the project managers linked to specific competences is an important factor in this. The answer of IPMA was the development of IPMA Delta.

The most important focus of IPMA Delta is competence. The development is not focused on project management processes, but on the capabilities of people. Increasing competence op people is developed through monitoring, training, coaching. IPMA Delta believes that project success can be gained through developing the competence of the people that are involved in the management. The Delta model has the purpose of assessing and certifying PM organizations. The model includes a variety of international standards, such as ISO 21500 and three IPMA standards IPMA's: ICB 3.0, Project Excellence and Organizational Competence Baseline (OCB) 1.0. The last three standards are also the core of which the model is composed of as can be seen in Figure 38.

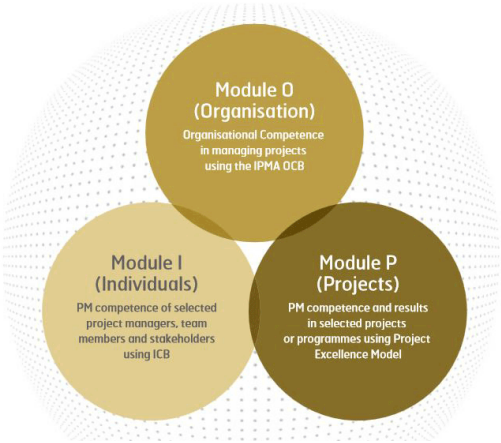

Figure 38: IPMA Delta (IPMA, 2015)

Module I: ICB 3.0 originated from the 1990's and further developed until now, dividing the competences in three factors, PM technical, behavioural, and contextual competences. Covering a total of 46 competences. The ICB 3.0 assess and certifies individuals on a four levels. The module measures the competence of the project managers, team members and stakeholders.

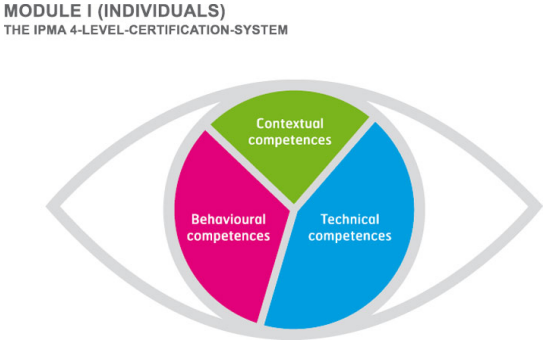

Figure 39: Individual competences (IPMA, 2015)

Module P, IPMA Project Excellence, based on the concept of European Foundation for Quality Management (EFQM), is adapted in able to assess enablers and results of projects. It checks the PM competence and the results of the selected projects. Part O, OCB 1.0 is the organizational competence measure tool, that uses self-assessment multidimensional questionnaire. The competence testing is divided into 5 Project-, programs- and portfolio groups of: Governance, Management, Resources, Organizational Alignment and People's Competences (IPMA, 2016):

Total defined in 18 competence elements, that is combined with the intended actions of users.

To become mature as an organization, IPMA believes that all OCB competences need to be integrated. With IPMA Delta as reference to check the competences and project statuses together with OCB 1.1 as reference. This should give a holistic representation of the organization, according to Bushuvey (2010).

The levelling of maturity is done in five 'competence' classes: initial, defined, standardized, managed and optimizing (IPMA, 2015). The model can be used to benchmark the organizational competence in managing projects externally with partners and internally. The certificate that the organization can gain, is used to show their competence to partner organizations.

Figure 40 gives an overview of part O, I and P, on which parts of the organization IPMA Delta covers.

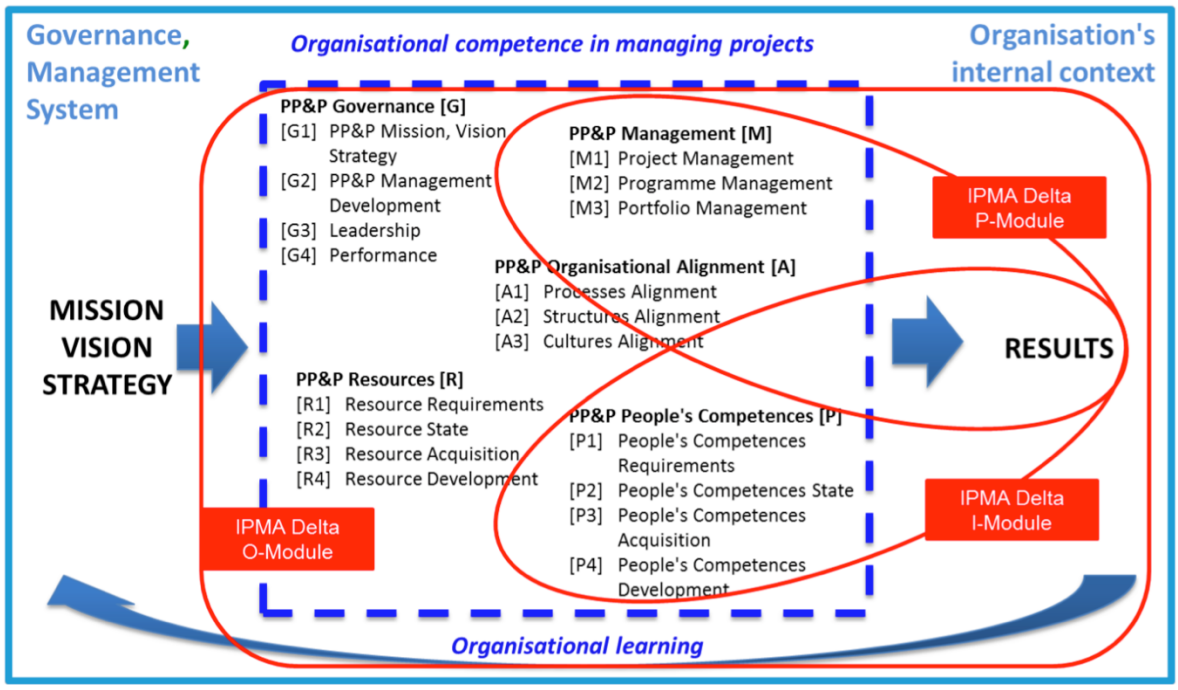

Figure 40: IPMA Delta overall view (IPMA, 2016)

Appendix B: Project management processes of a Water Board

The different processes were gained out of a project handbook.

Scope management

Scope management is about determining the boundaries. Scope is defined in several ways:
1. Project Scope: The work must be done to realize a product, service or result with specified properties and functions.
2. Product Scope: The features and functions that define a product, service or result.

Financial management

Financial management includes the preparation of estimates and the identification and allocation of the budget. It also includes the continuously monitor and control thereof.

Time management

A part of grip and direction is planning management. When planning management is about determining the feasibility and of achieving your goal / final milestone. By drawing up a plan. Then, the planning is the input for the determination of the capacity. With planning you also monitor the progress of the project implementation.

Capacity management

Capacity management includes capacity planning, establishment and allocation of resources and people with the right skills. It also includes looking at the way in which people and resources are deployed in the time and the continuous monitoring and control of these.

Stakeholder management

The management includes identification, managing stakeholders. It also includes the continuously monitor and control of stakeholders.

Quality management

In quality it is about quality awareness within the project and deliver it or you actually observe what you have agreed upon. Quality awareness through peer testing of products, assessments and implementing improvements by applying the PDCA circle.

Principal and the organization check compliance with the quality system through the establishment of an audit plan and perform audits. Audit results are then input to make improvements within the project and the department.

Risk management

Risk management is a continuous and systematic process with respect to the objectives of the project risks and identify opportunities, evaluate and control there for plans and implements.

Appendix C: First model

Onderwerp	Level 1	Level 2	Level 3	Level 4	Level 5
Proces standaard	Er is geen organisatie proces standaard voor projecten. Aanpak is verschillend en afhankelijk van het team en projectmanager.	Er zijn regels opgezet vanuit de organisatie, waarbij er een bepaald proces gevolgd kan worden bij een project met daarbij behorende project management (software) instrumenten. Alhoewel deze niet verplicht is, niet voor alle projecten wordt toegepast. Bovendien is het geen organisatie standaard	Er is één organisatie standaard voor het te volgen proces van een project met daarbij behorende project management (software) instrumenten. Deze zijn voor alle projecten toepasbaar. Het wordt verlangt dat iedereen de standaard gebruikt, echter niet verplicht.	De organisatie heeft een proces standaard, die per project aan te passen is met bijbehorende project management (software) instrumenten. Het gebruik ervan is verplicht. Standaard wordt aangepast n.a.v. de lessen die getrokken worden uit de projecten.	De project management proces standaard en zijn project management is continue in ontwikkeling door lessen die uit projecten worden geleerd. Dit zorgt voor continue innovatie in de aanpak en het beheersen van projecten.
Lessen	Er worden nog geen lessen geleerd uit voorgaande projecten.	Er wordt ad-hoc lessen geleerd uit projecten. Af en toe worden deze met anderen gedeeld en het zijn vooral persoonlijke lessen/ervaringen. Lessen worden na afloop van het project geëvalueerd.	Evaluaties worden consequent opgeslagen en geanalyseerd voor lessen. De geleerde lessen worden van project naar project doorgegeven. Echter, zijn er nog geen standaard momenten dat geleerde lessen gedurende en na het project worden verspreid.	Lessen worden die worden geleerd uit projecten hebben invloed op de proces standaard van project management van de organisatie. Er is één proces standaard vanuit de organisatie voor het opslaan, analyseren en verspreiden van lessen uit projecten.	Lessen worden continue geleerd en hebben invloed op de project management processen van de organisatie, waarbij deze continue wordt aangepast op basis van metrische data opgedaan uit voorgaande projecten. Dit zorgt voor project 'aanpak' op maat en een continue lerende organisatie.
Verwevenheid organisatie	De organisatie (+opdrachtgever) en het lijnmanagement houdt zich ad-hoc met de projecten bezig. Er is een sterke grens tussen afdelingen, werken op zichzelf en zijn slechts ter informatie	De organisatie (+opdrachtgever) en het lijnmanagement is betrokken met de projecten, als er grote scope wijzigingen zijn die van invloed zijn op budget. Andere afdelingen zijn ter informatie en ondersteunen, maar betreft geen samenwerking in projecten	De organisatie (+opdrachtgever) en lijnmanagement is betrokken bij projecten, doordat project plannen verbonden zijn met dat van de organisatie. Op basis van tijd, geld, resources (projectteam) schema's. Hier wordt niet vanuit gemanaged, maar is meer informatief. Andere afdelingen werken samen in projecten en ondersteunen in aangegeven fases.	De organisatie (+opdrachtgever) en lijnmanagement is betrokken bij projecten. Er wordt interactief gemanaged in projecten door de verwovenheid van organisatie schema's. Lijnmanagement is met expertise continue bij projecten betrokken en vormt onderdeel van het team. Er is continue afstemming en samenwerking in projecten door afdelingen, maar zijn geen onderdeel van het projectteam.	De organisatie(+opdrachtgever) en lijnmanagement is betrokken bij projecten. Er wordt interactief gemanaged in projecten door de verwovenheid van schema's en hebben direct effect op dat van de organisatie. Hier wordt gekeken naar continuee verbetering in de samenwerking, door lessen die geleerd worden. Afdelingen zijn integraal onderdeel van het team.
Projectmanager ontwikkeling	Bij het aannemen van een projectmanager wordt er niet specifiek gekeken naar expertise, meer naar vooropleiding en ervaring. . Trainingen voor project management worden nog niet vanuit de organisatie aangemoedigd.	Er zijn duidelijke regels voor het aannemen van een projectmanager. De projectmanager wordt wel eens geaudit op project resultaten. Training in belangrijke project managent skills worden wel aangemoedigd vanuit de organisatie.	Er zijn verplichte eisen, waar een projectmanager aan dient te voldoen voordat hij/zij wordt aangenomen. Competenties worden eenmalig bekeken. De projectmanager wordt continue geaudit op project resultaten. De trainingen in project management skills worden aangedragen vanuit de organisatie, maar zijn niet verplicht.	Er zijn verplichte eisen waaraan een projectmanager moet voldoen. Competenties worden vooraf en tijdens de carière gevolgd om projecten er goed op af te stemmen. Verplichte training opgelegd vanuit de organisatie voor behalen van certificaten. Andere educatie niet direct projectmanagement gerelateerd, wordt aangemoedigd.	Om aan de eisen te voldoen, wordt een projectmanager continue getest op competenties en project resultaten, voor het afstemmen van juist educatie traject. Dit is vanuit de organisatie verplicht om verder te kunnen komen en door te groeien.
Verantwoordelijkheid en succes	Projectmanager wordt niet persoonlijk op project resultaten beoordeeld. Succes wordt individueel gevierd.	Projectteam en manager worden gezien als verantwoordelijk voor project resultaten. Succes wordt in teamverband gevierd.	De project afdeling van soortgelijke projecten wordt gezien als verantwoordelijk voor project resultaten. Succes wordt gedeeld en erkend door projectafdeling.	De project afdeling wordt gezien als verantwoordelijk voor project resultaten. Succes wordt gedeeld en erkend door alle projectafdelingen	De organisatie ziet zich als verantwoordelijk voor de project resulaten. Succes wordt gedeeld en erkend door de gehele organisatie.

Table 6: First Model

Appendix F: Adapted model

		Verwevenheid organisatie				
		Laag	Laag/middelmatig	Middelmatig	Middelmatig/hoog	Hoog
Volwassenheids Perspectieven	Sub-*Perspectief*	**Level 1 - Individueel niveau**	**Level 2 - Project niveau**	**Level 3 - Programma niveau**	**Level 4 - Afdeling niveau**	**Level 5 - Portfolio (strategisch) niveau**
Proces standaard	*Organisatie standaarden*	Er is geen standaard opgezet en dit wordt niet gestuurd door het waterschap. De keuzes voor bepaalde processen of technieken in projectmanagement is ad-hoc en afhankelijk van projectmanager, rolhouder en team.	Er is een organisatie standaard die voor alle projecten wordt gebruikt. Invulling van de standaard processen is afhankelijk van de projectmanagers en rolhouders in het project om het geschikt te maken voor hun project.	Er zijn speciaal standaarden en processen in categorien vastgelegd. Projecten in een programma worden geplaatst in categorieen.	Afdelingsstructuren kunnen zich aanpassen om de project processen te ondersteunen. De afdelingen zijn continue bezig om standaarden en processen aan te passen voor verbeterde samenwerking tussen projecten en afdelingen. Ondersteunende afdelingen passen aan op nieuwe structuren om de project processen zo goed mogelijk te voorzien.	Bestuursstructuur past zich aan op de standaarden, processen van het projectmanagement om de projecten zo beter kunnen te ondersteunen.
	Systemen, technieken & methodieken	Gebruik van projectmanagement systemen, technieken en methodieken verschillen in alle projecten	Projectmanagement systemen, technieken en methodieken gebruikt in projecten zijn voor een groot deel hetzelfde, maar kunnen verschillen in de projecten. Hier zijn alleen basis regels voor.	Alle projecten en programma's gebruiken dezelfde projectmanagementsystemen, technieken en methodieken.	Zelfde projectmanagement systemen, technieken en methodieken worden gebruikt in samenwerking met de afdelingen.	Projectmanagement en corporate systemen, technieken en methodieken worden gebruikt in samenwerking met de afdelingen en bestuur op strategisch niveau.
	Overkoepelende systemen	Er is een systeem voor overzicht van projecten voor de afdelingen en bestuur, maar wordt nooit bijgehouden.	Er is een systeem waarin alle projecten overzichtelijk zijn voor de afdelingen en bestuur, maar wordt onregelmatig bijgehouden.	Er is een systeem waarin alle projecten overzichtelijk zijn voor de afdelingen en bestuur en wordt per maand gestructureerd bijgehouden.	Er is een systeem waarin alle projecten overzichtelijk zijn voor de afdelingen en bestuur en wordt per maand gestructureerd bijgehouden en loopt samen met relevante informatie van de afdelingen.	Er is een systeem waarin alle projecten overzichtelijk zijn voor de afdelingen en bestuur en wordt gestructureerd bijgehouden en loopt samen met relevante informatie van de afdelingen en bestuur.
Lessons learned		Er worden geen of ad-hoc Evaluaties en audits gedaan. Er worden hierdoor structureel geen lessen getrokken of gedeeld. Lessen die worden getrokken zijn persoonlijk en hebben ad-hoc invloed hebben op andere projecten.	Evaluaties worden gedaan in alle projecten. Lessen worden ad-hoc getrokken en hebben invloed op alle projecten zonder daarin te categorizeren. Coordinatie van deze lessen zijn afhankelijk van project managers, rolhouders of teamleden.	Audits en evaluaties worden structureel gedaan. Lessen hebben invloed op het programma niveau. Ze worden geanalyseerd en bekeken wat de verschillende gecategorizeerde projecten hiervan kunnen gebruiken. Coordinatie van audits, evaluaties en lessen gebeurt door afdelingshoofden per afdeling.	Audits en evaluaties worden stuctureel gedaan binnen de projecten en worden door de projectafdelingen gebruikt om te evalueren wat voor lessen eruit kunnen worden getrokken. Coordinatie van audits, evaluaties en lessen gebeurd op afdeling niveau and afdelingen coordineren en werken samen om lessen te delen.	Audits en evaluaties die worden gedaan in projecten. Bestuur houdt zich op strategisch niveau bezig om te kijken wat de geanalyseerde evaluaties invloed hebben op de structuur van de organisatie. Coordinatie van evaluaties, audits en lessen en gebeurt op strategisch niveau in samenwerking met de afdelingen om een geheel beeld te krijgen.
Projectmanagers, IPM rollen & bestuur	*Ervaring*	Er wordt uitgegaan van de persoonlijke krachten van de projectmanagers of rolhouders in de teams. Dit is voldoende.	Uit ervaringen van voorgaande projecten binnen of buiten de organisatie worden projectmanagers en rolhouders ingedeeld in projecten door de projectafdelingen.	Ervaringen van projectmanagers en rolhouders waarmee gewerkt wordt, wordt gedocumenteerd. Dit wordt gebruikt om project managers en rolhouders te kiezen voor komende projecten.	Vanuit HR is precies inzichtelijk wat de achtergrond en ervaringen van project managers en rolhouders die ze hebben opgedaan zijn in projecten. Hier kan vanuit worden gestuurd om gericht mensen op te leiden. Project afdelingen en HR werken daarop te sturen voor volgende projecten. Project planningen zijn goed inzichtelijk en kan direct op gestuurd worden.	Er is een bewustzijn over het belang van de ervaringen, niet alleen dat van projectmanagers en rolhouders, maar ook dat van de opdrachtgever binnen het bestuur. Deze worden ook gedocumenteerd en worden gebruikt bij ontwikkeling van de organisatie en projecten.
	Competenties	Competenties van projectmanagers en rolhouders zijn niet duidelijk. Er kan informeel worden aangegeven of er tijd is om mee te doen aan een project.	Competenties van projectmanagers en rolhouders zijn impliciet bekend bij afdelingshoofden en wordt op gestuurd voor het indelen van projecten. Afdelingshoofden houden gesprekken met projectmanagers of rolhouders geschikt zijn voor een project.	Competenties van projectmanagers en rolhouders zijn duidelijk en zijn eenmalig getest in de organisatie. Hier wordt op gestuurd. Dit wordt gebruikt bij het indelen van projectmanagers of rohouders in projecten.	Project- en HR afdeling werken goed samen om zo competenties inzichtelijk te hebben en daarop te sturen in projecten. Competenties van de projectmanagers en rolhouders zijn duidelijk en worden bijgehouden. Deze competenties worden regelmatig getest.	Bestuur heeft inhoudelijke kennis in projectmanagement en weten wat belangrijk is. De rol van directieleden is duidelijk binnen de projecten en hun competies waarin ze verder kunnen bijdragen in de projecten als opdrachtgever. Alle competenties worden bijgehouden van iedereen in de organisatie.
	Educatie	Educatie is uit eigen motivatie en is voor eigen rekening.	Er is een algemeen of persoonlijk trainingsbudget beschikbaar dat kan worden gebruikt. Alleen basisopleidingen worden vanuit de organisatie aangeraden.	Educatie wordt afgestemd op de categorieën van projecten waarin projectmanagers en rolhouders hun voordeel mee kunnen doen en wordt gemotiveerd vanuit de organisatie en betaald. Er is een persoonlijk budget ervoor beschikbaar.	In samenwerking met de inzichten van HR wordt gericht gestuurd om mensen verder op te leiden. Budget is persoonlijk ingericht op ambitie.	De gehele organisatie is bezig om actueel te blijven in projectmanagement ontwikkelingen inclusief het bestuur. Om hierdoor dichtbij projectmanagement te blijven staan.
	Capaciteitsmanagement	Capaciteitsmanagement tussen afdelingen en projecten wordt beperkt of niet gecommuniceerd.	Capaciteitsmanagement vanuit de afdeling wordt goed in projecten gecoördineerd, maar planningen worden te weinig geactualiseerd.	Capaciteitmanagement wordt gecoördineerd door de projectafdelingen in samenwerking met de ondersteunende afdeling, waarin beschikbaarheid goed inzichtelijk is voor de afdelingshoofden.	Capaciteitmanagement wordt gecoördineerd als een geheel in de afdelingen, waarin alles inzichtelijk is en wordt bijgehouden om zo makkelijk rollen en projectmanagers in te delen in projecten.	Capaciteitsmanagement systemen zijn geautomatiseerd en worden met nieuwe inzichten door het bestuur vanuit het projectmanagement aangepast.
Cultuur	*Verantwoordelijkheid*	Projectmanager en rolhouders wordt niet persoonlijk op project resultaten beoordeeld.	Projectmanagers en rolhouders worden gezien als verantwoordelijk voor project resultaten.	De projectafdeling van soortgelijke projecten wordt gezien als verantwoordelijk voor project resultaten.	De project afdeling wordt gezien als verantwoordelijk voor project resultaten.	De organisatie ziet zich als verantwoordelijk voor de project resulaten.
	Succes	Succes wordt individueel gevierd.	Succes wordt in teamverband gevierd. Project informatie wordt verder niet in de organisatie gedeeld.	Succes wordt gevierd in teamverband. Projectinformatie van projecten van belangrijke programma's en grote projecten worden gedeeld met de organisatie.	Succes wordt gevierd in afdelingsverband. Projectinformatie van alle projecten wordt gedeeld en erkend door de projectafdeling en bestuur.	Succes en informatie wordt gedeeld van alle projecten en erkend door de gehele organisatie.

Table 7: The Water Board Project Management Maturity Model

Appendix H: Scoring model

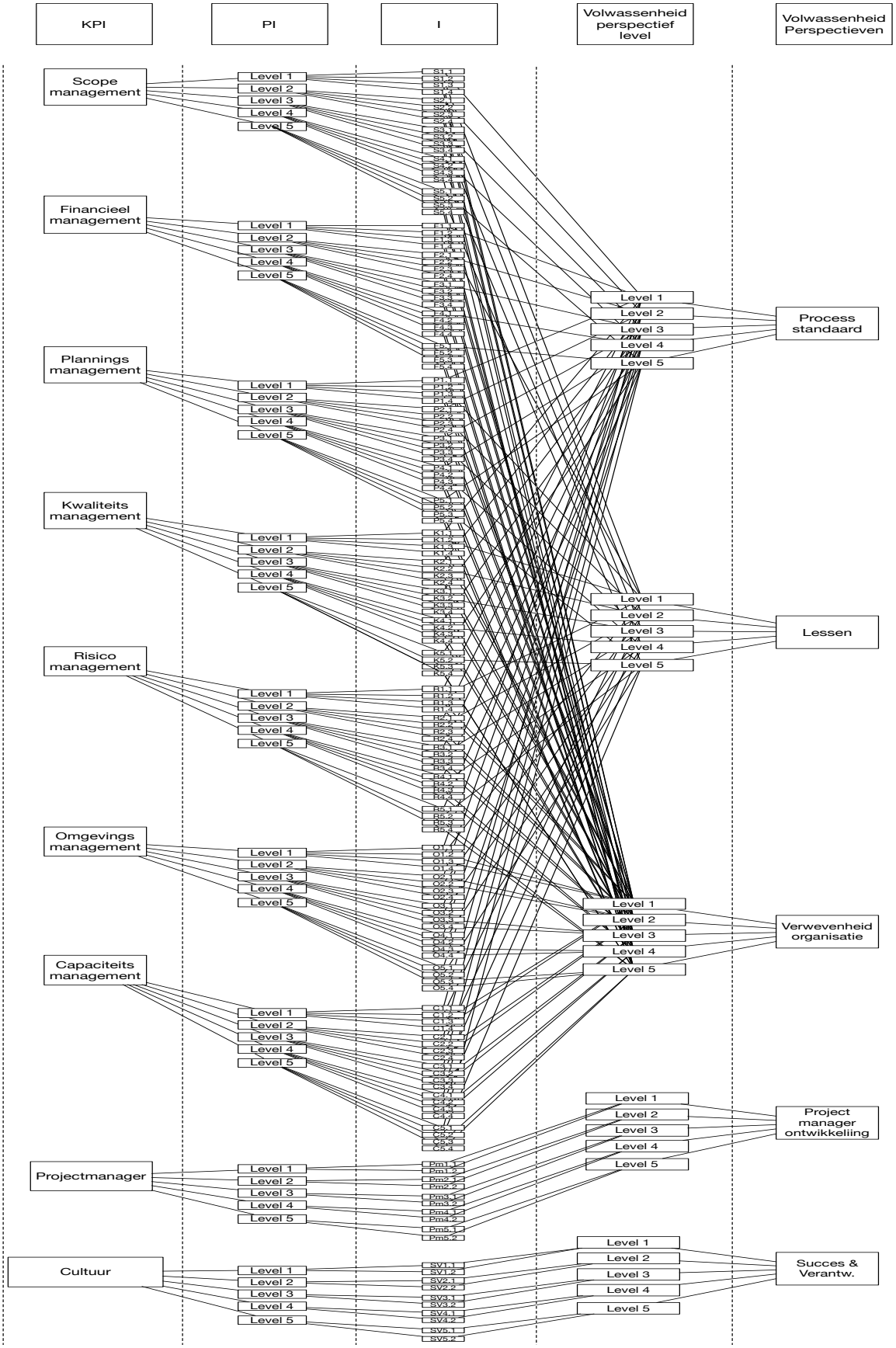

Figure 41: Scoring of the model