Master Thesis

Management control systems within public project organizations

The influence of instruments and the levers of control on obtaining project control in public project organizations

Kishan Poeran 332787kp

Coach: Drs. M. van Dongen

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Executive summary: this multiple case study demonstrates that using only instrumental control mechanisms is not sufficient to obtain project control. Project organizations that score well on the management aspects of project control, use a mix of instrumental (tool) oriented and people oriented control mechanisms. Controlling is not simply setting a target and believing that the intended results will be achieved naturally. The issues of how to motivate and challenge the use of human talent and intelligence deserve more attention to obtain project control. Controllers are considered to be responsible for the initiation, development and operation of management control systems. The controller that actively contributes to changes and is looking to the balance between control and innovations will obtain an optimal project control.

I Preface

In this Master Thesis: "Management control systems within public project organizations", the use of instrumental and people oriented control mechanisms have been researched to obtain project control in various public project organizations.

After many months this Master´s thesis is completed, with the help of a number of people. I would like to thank my thesis supervisor Drs. M. van Dongen, supervisor Drs. R. Derksen and ConQuaestors research team. Their recommendations, comments, suggestions, advice and support have helped me to analyze the maturity model and to compose this Master Thesis. During the entire process of writing the thesis, they always encouraged me to preserve and continue. I also want to thank the respondents from the public project organizations for their participation, time and cooperation in this investigation. Without their cooperation and participation, this research would not had have been possible.

In particular, I want to thank my mother for the help, support and love which she has given me during the writing of my thesis and my pursuit of a Master´s degree. When I had difficult moments, she encouraged me to persist and be steadfast.

Writing this thesis has been a good learning experience. I have visited a number of dynamic organizations where activities are organized in projects. I have spoken with very committed, energetic and motivated (project) controllers who have shared their experiences on their projects to obtain project control. I also learned a lot from studying the levers of control, which are described by Simons, project control and project management methodologies from a theoretical and practical perspective. Moreover, I gained experience with organizing the masterclass about project control on May 19, 2011 in order to present the research results of this multiple case study to the participated respondents. Personally, I am very pleased that the respondents decided to consider applying the recommendations in their project organizations. Their intention makes me happy, energized and feel appreciated for doing this research.

Kishan Poeran

Rotterdam, 16 November 2011

II Executive summary

In this Master Thesis, the use of instrumental and people oriented control mechanisms have been investigated, with specific project management control systems, to obtain project control in various public project organizations.

Multiple case study have shown that using only instrumental control mechanisms (tools) is not sufficient to obtain project control. Organizations obtain positive results on project control (money, time, quality, information and organization), when a mix of instrumental oriented and people oriented control mechanisms is used. Based on the results of this research, a specific project management control systems have been developed for various public project organizations. In order to obtain a professional project control, the following general recommendations are provided.

First of all, management should provide core values which should be used within the organizations.

Second recommendation is that the management has to provide clear boundaries for their employees. Thereafter, the interactive control should establish communication between top management and the other involved parts of the organization, with the aim of organization-wide learning process in motion to improve practices and procedures to discover. Furthermore, an evaluation, of the performance in the execution of the projects is needed to explore more efficient and effective procedures for the execution of future projects.

A project is often formed after the acceptance of a business case. After approval of the business case, the uniqueness of project objectives, measurability of outcomes and impacts of awareness on intervention help to determine the stage of execution. These determinants make performance objectives possible and increase the result orientation of the present culture within the organization. Uniformity, measurability and awareness of the effects on intervention can be enlarged by performing several series of mini projects. As a result, it would not take long before effects of interventions and possible shortcomings in processes of human behavior appear. Possible shortcomings of human behavior in the process will be reduced to a minimum with the aid of experienced, motivated and committed project employees and an effective adjustment of the planning and control cycle. Within many organizations, there is increasingly a criterion established to obtain project control, whereby projects must have a relationship with the strategic organizational objectives. Projects also should be

in accordance with the established conditions that will be performed and monitored to obtain project control.

The instrumental control mechanisms: project governance, project portfolio management, business case management and risk management are necessary tools that should be adapted to the needs of the organization. In this context, it should be noted that innovation and control most interact. Escalation mechanisms (project governance structure) must be pre-adjusted and be made clear to all involved stakeholders, so that timely intervention is possible. The (project) controller should also be positioned independently on the project and the project manager, so the (project) controller can fulfill his role without being dependent, objective and critical to obtain project control.

The (project) controller should also be an independent business and sparring partner of the project manager and top management and offer a less supportive role towards the project manager. Experience and motivated project managers, employees, and (project) controllers are required to obtain project control.

Using many instruments and tools correlates negatively with project success and the work style correlates positively with project success. Therefore not many instruments are required to achieve project success.

Finally, public organizations should make changes at management level and in the management style to obtain project control. Nowadays, change management and management style are necessary to make a "compact public service" and a retreating government possible. The control framework by Simons can play an important role in the implementation of organizational strategies in rapidly changing environments. The controller that actively contributes to organizational changes is looking to the balance between control and innovations and will apply this control framework. To change or to get people in motion occurs by motivating them to learn and by bringing them into learning situations through increasing the organizational learning capacity *(interactive control systems)*. When people have an attitude which is open to change *(belief systems)*, steps could be taken to create a result-oriented culture. Organizations with a result-oriented culture are more able to obtain project control than organizations without a result-oriented culture.

Index

1 Introduction

In 1997, the Court of Audit (Algemene Rekenkamer) investigated the (partial) failure of the ICT projects of the Dutch government. Governmental ICT projects often turned out to be more expensive than budgeted, took longer than planned or did not deliver the desired results. This problem is not unique for the ICT projects or the (Dutch) government (Algemene Rekenkamer, 2007). In response, it was decided that public organizations should deal more efficiently and effectively with public funds through drastic budget costs.

In the past few years, public organizations have invested intensively in strong and innovative management tools (Van der Zee, 2009). Adequate management is necessary to deal responsibly with public funds. In addition, public support needs to be created in the part of the taxpayers and voters. This requires an efficient and effective approach to obtain project control within the project based environment of public organizations.

Management control systems should assure management, that the obtained resources are used efficiently and effectively to achieve the strategic organizational objectives. Management control systems are generally instrumental in nature. These systems are designed to influence behavior of individuals so that the activities of those individuals and departments in which they are organized are efficiently and effectively implemented and aligned with the interests of the organization. A well-designed management control systems in a project based environment is the basis of obtaining project control.

The instrumental nature of control mechanisms is not sufficient to obtain project control. Previous research (Strikwerda, 2003) has showed that the human factor, i.e., "people and culture", is a critical success factor for improving the effectiveness of management control. Management control is exercised through a variety of mechanisms, including the social psychological mechanism. Within organizations, human behavior is an important subject in completing a project successfully.

1.1. Problem and sub questions

Previous research conducted by Simons has shown that effects of leveraging exist between the use of instruments and people oriented control mechanisms to achieve strategic organizational objectives in a congruent way (Simons R., 1995).

In the ideal situation, top management provides strategic objectives and the employees pursue them. Unfortunately, this is very difficult in practice. Goal incongruence and the principle-agent theory explain the existence of management control. The principal-agent theory is defined as 'an agent's pursuit of their self-interest instead of the principal's '(Zimmerman, 2009). 'Goal incongruence is the extent to which a transaction is inconsistent with what the person wants- that is; it thwarts personal goals' (Jenkins, Oatley, & Stein, 1998). These definitions show that stakeholders are not always pursuing the company's interest. Using management control helps to reduce this problem.

The central question that will be answered in this research is as follows:

Which instrumental and people oriented control mechanisms should management control systems in a public project based environment exist?

A project is defined as a set of (related) activities and tasks, with a clear specific end result, a beginning and final date, constraints and a client or principal. A project is a temporary venture which aims to achieve a single innovation, improvement or organizational change. Because of the newness of projects, projects include risks and uncertainties, so it is uncertain whether the project results will be achieved (Gevers & Zijlstra, 2001). Projects are regarded as efficient, if the five criteria of management aspects, i.e., time, money, quality information and organization are met.

The problem that will be investigated during this research is divided in the following three sub questions. The first question is as follows:

1) **Which determinants are necessary to obtain project control?**

A follow-up study has been done with regards to the determining factors distinguished by Van der Zee (Van der Zee, 2010). Practical research has to investigate whether using instrumental control mechanisms, i.e., project governance, project portfolio management, business case management and risk management, contribute to obtaining project control in practice.

Here it is assumed that public organizations using instrumental control mechanisms are more successful in obtaining project control, than organizations that do not use these. The *null hypothesis (H0)* is therefore as follows:

(H0) The use of instrumental control mechanisms within a public project based environment are necessary to obtain project control.

Management control systems should be a balanced system with instrumental and people oriented control mechanisms (R. Simons, 1990). The alternative hypothesis *(H1)* for this sub question is as follows:

(H1) The use of instrumental control mechanisms within a public project based environment is not necessary to obtain project control.

The second sub question is as follows:

2) **What role does the human factor (people and culture) play in obtaining project control?**

To obtain project control, hard controls, soft controls and organizational culture should be mutually included in the desired project objectives. The difference between hard controls and soft controls is to some extent similar to the much used distinction between tight controls and loose controls, often described in terms of leaving a little a much room for personal freedom, interpretation and action alternatives for those who are subjected (Aardema & Puts, 2008). Soft controls can be viewed as measures that affect, for example, motivation, loyalty, inspiration and core values of employees. The organizational culture consists of several key elements including the shared beliefs, shared values, behavioral norms, and assumptions that are implicitly and explicitly accepted in the organization (Anthony & Govindarajan, 2007). Soft controls and a result-oriented culture are both important factors in people oriented control mechanisms.

Successful projects need more than a tight control, good planning and a strict budget control. The key to success lies in generating projects and addressing energy, commitment and creativity of people so that more complex projects can be realized with less coordination (Bos, 2006).

It is assumed that using a balanced instrumental and people oriented control mechanism, combined with a result-oriented culture are aimed at delivering pre-agreed specifications, given a set of conditions. Here are the specifications within the agreed time and the resources approved by the principal and client. Furthermore, it is assumed that public organizations are more able to obtain project con-

trol, when they can best utilize the human factor (people and culture). If the human factor is not taken into consideration, an important tool in the improvement of management control is missing.

The *second hypothesis (H2)* for this sub question is shown schematically in *figure 1* with determining factors distinguished by Van der Zee. It is therefore as follows:

(H2) The people oriented control mechanisms (people and culture) are the foundation for obtaining project control in a public project based environment.

Figure 1: Determinants project control [1]
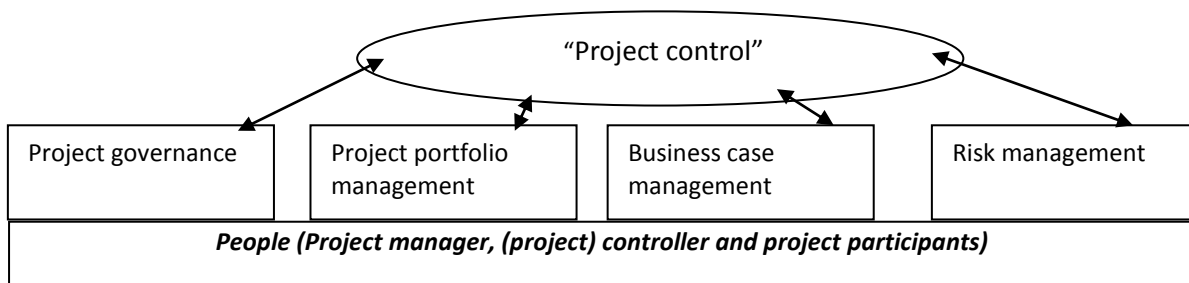
The third sub question is as follows:

What is the role of the (project) controller in the initiation, development and operation of management control systems in a project based environment?

Because in theory and practice a controller has many differing roles and responsibilities, research has to be done to the history and development of the controllers role in the initiation, development and operation of management control systems in a project based environment. In addition, the roles and the relationship between the (project) controller and (project) manager in the operation of management control systems will also be investigated.

It is assumed that public project organizations with (project) controllers which have an independent advisory role to the top management are more able to obtain project control. This appears in the

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[1] Project governance is a management framework whereby decisions about project management are made. In this context, there will be an environment created around the organization where the project management optimizes the strategic organizational objectives in order to obtain project control. With project governance, there is a complete solution for processes with a strategic interest and increased risk for the organization, characterized by the presence of multiple subprojects and a substantial commitment of people, time and budget. In addition, with project governance, organizations are able to select projects which fit within the strategic organizational objectives, such as, to set up the project organization, monitoring projects smoothly and to obtain organizational changes.

contract with public project organizations in which (project) controllers which have a mainly support-ing role to the project managers. Practical research has to demonstrate this. The third hypothesis for this sub question is as follows:

(H3) The (project) controller should be an independent advisor and should therefore not be positioned hierarchically on the project.

1.2. Goal and relevance

Previous research on the operation of management control systems in a routine setting are frequently more focused on the human factor (Merchant, Simons et al). Research into the operation of management control systems in a project environment focuses primarily on the instruments, tools and project management methodologies to obtain project control (Anthony, Merchant et al). So far little academic research has been done on the influence of the human factor in a project environment.

The main purpose of this research is, to get insights on which instrumental and people oriented control mechanisms with specific management control systems should be used to obtain project control, through a multiple case study. This research is socially relevant because this study deals with current issues, such as, drastic budget cuts in public project based organizations. Finally, this research contributes to the contemporary scientific literature on obtaining project management control systems and the role of the controller in the development, initiation, and operation of management control systems in a project based environment.

1.3. Brief literature review

The theoretical framework of this study is developed by using literature in the field of management control systems. In the elaboration of the theoretical framework the views of Anthony and Simons are used in specific. Furthermore, the determinants of failures by Van Aken and the determining factors by Van der Zee, to obtain project control are an important part of the literature review. The literature of Hofstede about results-oriented culture within public organizations has also been investigated. These theories have a significant impact on the development of the theoretical framework and the maturity model and its operation in practice.

1.4. Research method

In order to answer the central question and hypothesizes, a maturity model will be developed. This maturity model *(see paragraph 3.2)* for public organizations includes determinants which

management control systems in a project environment should have to obtain project control. This maturity model gives insights in the level of maturity of the organization and provides steps to achieve a higher level of maturity.

Using this maturity model and self assessments, in-depth interviews will be conducted with representatives from departments, agencies and executive agencies organizations that are responsible for the development, initiation and operation of management control systems in a project based environment.

As an input for the in-depth interviews, digitally self assessments are completed in advance. The self assessments give the respondents the opportunity to assess their project organization on the five management aspects of project control including time, money, quality, information and organization, as well as the presence of instrumental control mechanisms *(see appendix III: self assessment public project organization)*. The self assessments consist of four parts: general organizational information, nine statements on project control, evaluation of project management control systems and the ability to reach determinants to obtain more project control. The self assessments focus on the completion of the questions by respondents and provide guidance advance for the in-depth-interviews. Based on the self assessments and in-depth interviews *(see appendix X: report depth interview public project organization)* the level of maturity on project control will be determined. Based on the results of the self assessment and the in-depth interviews personal feedback from the respondents are collected and a specific report will be prepared for them**.** This individual report on the respondent will not be shared with other respondents in this study to obtain confidentiality.

The research method that will be used during this research is an applied empirical research in the form of a multiple case studies with twenty-five various public project organizations. Through a multiple case study determinants will be provided to develop specific management control systems to obtain project control. By choosing a multiple case study this research will have a descriptive nature.

1.5. Data collection

For the data collection, existing contacts are used from an advisory company, that regularly provides services including the planning and control cycle for various public organizations with management control systems.

For this multiple case study, fifty officers working in controller positions at public project organizations with the project typologies ICT, infrastructure and other projects were approached by the board of the advisory organization. In specific, they were chosen from the project typologies ICT and infrastructure because this type of projects are in accordance to the research done by the Court of Audit (Algemene Rekenkamer). These projects are often more expensive than budgeted, take more time than planned or do not provide the desired results. The other project organizations are added as a control group. The position of the controller, was chosen to investigate the role of the (project) controller in the initiation, development and operation of management control systems in a project based environment.

Once the controllers agree with participation in the in-depth interviews, they will receive a digital self assessment questionnaire on the five management aspects of project control including time, money, quality, information and organization, as well as the presence and using of instrumental control mechanisms. Validation and verification of the received data is carried out through depth interviews with respondents.

The internal validity of this research is obtained by twenty-five respondents divided by the project typologies ICT, infrastructure and other projects. Hereby nine ICT projects, ten infrastructure projects and six other projects of public organizations with a project based environment will be examined on the use of instrumental and people oriented control mechanisms in order to obtain project control. The external validity cannot be guaranteed because of the small population size of twenty-five public organizations divided by three different project typologies and maturity levels. Results are therefore not generalizable and no valid statements can be made (Verschuren, 2007).

1.6. Development thesis

This master thesis consists of five chapters. In this chapter the central question, problem, sub questions, hypothesis, scientific relevance, research methodology and data collection have been described. In the second chapter the literature review of management control, project management control system, project control and the role of the controller will be described.

After the literature review in the second chapter, the third chapter will describe the development of the theoretical framework and maturity model. The fourth chapter will present the research results of the multiple case study from a practical perspective.

In the fifth chapter the conclusions, recommendations and possibilities for further research will be presented. Finally, there will be an epilogue where the findings and comments of the respondents are presented from the masterclass on 19 may 2011, which has organized to provide the research results and to generate discussions. The references and further explanations in the appendixes on the research results follow the epilogue.

2 Literature review

This chapter describes the literature that has used to develop the framework and maturity model *(see chapter 3).* First, in section 2.1., management control and the control framework by Simons will be described. In section 2.2., project management control systems are compared with management control systems. The key factors for project control will be described at section 2.3.. Section 2.4., describes the role of people and culture and their contribution towards the strategic organizational objectives. In section 2.5., the application of management control from the perspective of a public organization is described. Section 2.6., describes the role and development of the controller position. Finally, in section 2.7., the conclusion of this chapter will be presented.

2.1. Management Control

Using management control systems allows managers to deploy the resources effectively and efficiently in achieving the strategic organizational objectives (Anthony & Govindarajan, 2007).

Simons has developed a control framework that is important to pursuit the strategic organizational objectives. The control frameworks focus on communication of information for empowerment, innovation and control and to connect them with each other (R. Simons, 1995). Empowerment means that in addition to the top management the employees will have more decision-making power and rights, it is believed that this is the way to achieve the desired results more effectively. Managers can not take possession of all information and decisions**.** Innovation comes down to human activities aimed at improvements of strategic objectives and purposes.

The purpose of this framework is to implement management tools, which patterns in organizational behavior can maintain or change. This should be done in such a way as to minimize the final control risk to a certain level. The core principal within the control framework of Simons is an interaction between instrumental and people oriented control mechanisms.

It is about the interaction between the instrumental and people oriented control mechanisms with a leverage effect between *belief, interactive, boundary and the diagnostic control systems*. The leverage effect and the levers of control, reinforce each other and allow for strategic organizational objectives efficiently and effectively. The four levers of control of Simons are presented in *appendix II.*

Belief systems encourage individuals to seek new opportunities and ways to create value for individuals to commit to organizational objectives. Effective managers are trying to communicate and inspire employees on the organizational core values and mission. These managers believe in the innate potential of people to innovate and add value to the strategic organizational objectives. According to the mindset of Simons, there must be a strong identification with the core values whereby a kind of social control is created by employees. This social control will reduce abnormal behavior with respect to the core values. It will also lead that project employees will pursue the strategic organizational objectives in a effective way (R. Simons, 1995).

Boundary systems provide limits (e.g., frameworks, conditions, rules and code of conducts) for the project employees so that unethical behavior can be reduced to a minimum level. In addition, the boundary systems are designed to mitigate risks. These systems indicate the limits on the employees in the organization that should not be exceeded.

Diagnostic control systems are used to monitor objectives, key performance indicators and to correct deviations from the predetermined standard. But the application of diagnostic control systems will not be sufficient to obtain effective control, because the interaction between instrumental and people oriented control mechanisms with the leverage effects between belief, interactive, diagnostic controls systems and boundary systems is of most importance (R. Simons, 1995)

The **interactive control systems** are focused on the strategic organizational uncertainties and are also used for organization-wide learning and improvements of organizational strategies. The interactive control is a continuous interaction between top management and other involved parts of the organization to recognize inside and outside signals and to respond to the organizational strategy. Interactive control systems enable managers to focus on strategic organizational uncertainties, to learn about threats and opportunities and competitive conditions that changes and to respond proactively (R. Simons, 1995).

With the diagnostic control system and boundary systems-yin- strict limits are placed which are complemented by the belief systems and interactive control systems-yang which provides room for the required creativity. Simons offered a solution with the principle of the levers of control, where an interaction is sought in the required creativity and control.

Within the levers of control, management should first provide the core values of the (project) organi-zation. Management also needs to provide clear boundaries in which employees should remain. Se-condly, the interactive control should be focused on the communication between top management and the other involved parts of the organization to achieve the organizational objectives. The pur-pose of an interactive control is to create organization-wide learning process in motion by conti-nuously reducing shortcomings in behavior of human processes, optimizing processes and improving organizational strategies. Managers can achieve this by periodically identifying risks, evaluating the effects of interventions and applying this knowledge at existing management measures according to the planning and control cycle (plan-do-check-act).

2.2. Project management control systems

Management control are formal systems with a recurring cycle of activities. A project can be defined as achieving a specific goal and specific outcome, consistent with the intended objectives of management. In this context, a range of activities and tasks are performed and resources and people are used for a certain period.

Management control and project management control systems both have the achievement of strategic objectives as their purpose. During the cycle, plans are made, implemented and results are evaluated to achieve the intended objectives efficiently and effectively. A control system should assure that the planning of activities is performed properly (Anthony & Govindarajan, 2007).

2.3. Project control

Since the concept of control is used differently in practice, control can be defined as the responsibility of management in control. Management is concerned with the strategic organizational objectives and how the leadership of the organizations affect the employees with their frameworks, conditions, rules and incentives. Control refers to controlling processes, chains of processes, products, projects and programs, which are set according to established plans and standards. The entire management and control is referred to as integrated management (Nimwegen van & Spits, 2002). A comparison can be made with the control framework from Simons:

- Belief systems and boundary systems mainly concerns "management"; and
- Diagnostic control systems and interactive control systems mainly concerns "control".

Particularly, these two last terms are about "control". Control is not just about 'integrated management' based on regular appointments on a specific part of an organization, but it is also

about a combination of managing and controlling subjects (Nimwegen van & Spits, 2002). Project control can be defined as the combination of management and control subjects, to achieve a predetermined objective with a planning, budget, mandates and a finite duration (Aardema & Puts, 2007).

Principals and contractors often use project plans, milestones and budgets to reduce risks and obtain project control. In addition, performances are reviewed periodically to optimize procedures at the execution of future projects so that the repeated mistakes can be reduced to a minimum level and project control can be more obtained in the future. Despite these control measures, which are instrumental in nature, chances exists that the desired results of the principals project will not be achieved fully (Mata & Ashkenas, 2005).

In the nineties, several studies were conducted to research the successes and failures of projects, including Van Aken (1996). Previous research into the failure of project control by Van Aken shows that excessive use of instruments correlate negatively with success, while the work style correlate positively with project success. This is contradictory, because in the literature of project management much attention is paid to the use of instruments and project management methodologies. This suggests that project management is similar to the use of instruments. In addition, the study by Van Aken shows that excessive structuring of projects (such as procedures and formats) limits the freedom of the project manager and the success of the project. In other words, each project should be approached uniquely. A project manager needs the freedom to approach projects in a unique way.

The project manager should also recognize areas that need more attention and should discuss these with the management so that interaction can be created within the project organization. Project control needs human talent, space for movement, alternative interpretations and action of those who are subjected to controls, rather than boundaries and control instruments. Controlling is not just simply setting a target and believing that the intended result will be achieved automatically (Aardema & Puts, 2008). Issues of motivating and challenging the use of human talent and intelligence deserve more attention. Therefore soft controls become more important.

A critical success factor for efficient and effective project execution is to perform several series of mini projects so that the project team will share the responsibility to show fast, efficient and effective results of interventions. The impact of possible shortcomings of interventions will be more

quickly visible by using the interactive control systems. By performing series of mini projects measurable results will be obtained. The total effort of the organization as a whole is reduced and the sense of personal challenges is increased by a shorter time frame. Team members have a sense of urgency from the beginning of the project, so that no time will be wasted (Mata & Ashkenas, 2008). Project control and risk management is not only about instrumental mechanisms, tools and techniques, but it is also about the attitude of employees. This is in line with the findings of the control framework from Simons. Finally, it is about the interaction between the instrumental and people oriented control mechanisms with leverage effects between the *belief, interactive, boundary and diagnostic control systems.* Performing several series of mini projects has similarity with the interactive control systems of Simons and the control typology proposed by Hofstede, whereby the shortcoming of human behavior in processes will be reduced with experience and adjustments on interventions of the planning and control cycle.

Besides Van Aken, Van der Zee has provided a number of decisive factors in order to obtain project control. In *figure 2*, these decisive factors will be presented.

Figure 2: Project control
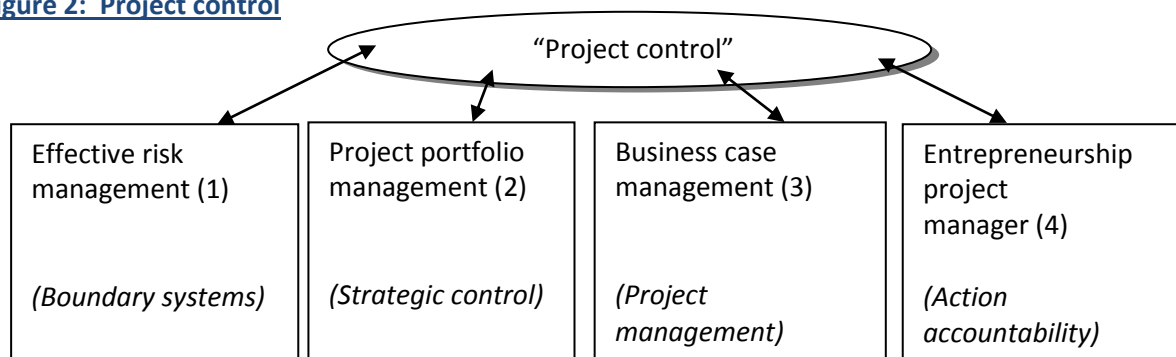
Since unforeseen circumstances always appear in projects, effective risk management, project portfolio management, business case management and entrepreneurship of the project manager are necessary determinants to obtain project control.

Effective risk management can be defined as managing risks and limiting the unintended consequences to an acceptable minimum for the organization so that the organizational objectives can be achieved. Methods of risk management are risk reduction, risk retention, risk transfer and risk sharing. A continuous evaluation of risks, whereby the cycle is assessed by identifying risks, evaluating controls and adjusting management areas according to the planning and control cycle are

necessary to manage risks effectively (Raval & Fichadia, 2007). Risk management, especially the prevention of risks are part of the *boundary systems* of Simons.

Project portfolio management is a *strategic control*, whereby the organization strategy and the project portfolio management are aligned with each other. Performed projects with specific objectives and results should therefore be connected with the interest and objectives of top management. Project portfolio management is focused on managing the overall project portfolio of an organization (Van der Molen, 2003). Project portfolio management supports the organization in making fundamental informed choices about the allocation of scare resources (budget, time and employees) to potential and ongoing project based on their contributions to the strategic organizational objectives. Only when the relationship of the projects to the strategic organizational objectives are clear, a clear business case for the product could be prepared, monitored and actions conforming to the planning and control cycle could be taken to obtain project control.

Business case management can be defined as an economic and social justification for a project, based on costs, benefits and risks of the project. Besides a financial consideration of costs and benefits, a business case management is concerned with measurable results, global design of the goal situation and the inventarisation of project risks (Van der Zee, 2010).

The entrepreneurship of the project manager can be compared with *action accountability* whereby the project manager is held accountable for his performed activities. This requires a clear definition, communication and rewards (Merchant & Van der Stede, 2007). In the entrepreneurship of the project manager, the organizational interests stay above the concluded interests of the projects. Bottlenecks are discussed and the responsibility of stakeholders will be communicated with the stakeholders of the project (Van der Zee, 2010).

2.4. People and culture

As it was stressed before, it is important for organizations that the behavior of managers and employees is in line with the organizational objectives. The behavior of employees is by nature focused on obtaining their own environment of liberty and to escape from influence from above (et al Janssens & Steyaert, 2001).

Behavior can be described as the way individual responds to the organizational environment. From this definition, it can be concluded that behavior can be influenced by changes in the organizational environment.

As it was demonstrated before, management control systems are used to influence behavior so that managers and employees will behave and respond in the desired manner. Using management control contributes to reducing goal incongruence. Soft controls in the sense of efforts from the top of the organization to control behavior of employees, cannot guarantee the desired effects. But respect and what occurs in the workplace while thinking and making decisions, known as soft controls, put the board of management in the position to aim at the effective interventions with a planning and control cycle**.** In this context hides the hardworking of soft controls. Paying attention to adjustments, connecting underlying motives and interest of people put the board of management in a more effective control position, instead of a top down desired goal approach (Aardema & Puts, 2008).

Many determinants influence the organizational behavior of managers. Previous studies of Merchant and others have shown a relationship between leadership, style, evaluation style and behavior of managers. The results of these studies have shown that organizational environment and personal factors affects this relationship. But despite these investigations further research will be required to understand the nature of this relationship under different conditions. In this research the focus is on the influence of leadership style and the influence of organizational culture on managerial behavior, because behavior is a broad subject (Anthony & Govindarajan, 2007).

The leadership style of a manager can be determined by various factors, such as personality, organizational culture and the type of work that is performed in the organization. As previously described the organizational culture consists of several key elements: including shared beliefs, shared values, behavioral norms and assumptions that are implicitly and explicitly accepted in the organization (Anthony & Govindarajan, 2007).

2.5. Public organizations

Public organizations are not profit oriented, in contrast to private organizations. Public organizations aim to use the available resources as efficiently and effectively as possible to achieve economic and social societal objectives. The basic needs of public organizations and private organizations are both

to monitor and proactively respond on activities of employees to ascertain whether they are in line with the organizational strategy.

Expanding the concepts of management control and project management to activities which are related to public organizations is desirable (Hofstede. G, 1981, No3.). Hofstede has proved that public organization require certain types of control which depend on the following four criteria:

- clarity of objectives;
- measurement of outcomes;
- knowledge effects of interventions and;
- repetitive activities (Hofstede G. , 1981, No3.).

Depending on the type of activities, the control typology of Hofstede (*see appendix II; Hofstede control typology)* can relate to routine, expert, trial and error, intuitive, judgmental or political control (Hofstede. G, 1981, No3.). The control typology of Hofstede depends on the extent to which objectives are defined as specific, measurable, achievable, realistic and timely (SMART). Objectives of projects can be achieved better when the targets are defined SMART.

2.6. Role of the controller

Kocks (Kocks, 2004) states that controllers are responsible for the initiation, development and operation of management control systems.

In the literature of Vaassen and others, usually two controller roles are distinguished, namely, the "corporate policeman" and the "business advocate". The business advocate is strongly committed to supporting the management at all levels and less on the reliability of financial information. This type of controller has a strong prospective view and is strongly associated with the business and mainly fulfills a supporting role by making decisions for the top management and basically has a stimulating role towards the project manager to obtain project control (Vaassen, 2003). The controller analysis for example how products can be positioned and how the financial risk can be reduced (Riedijk, Tillema, & Moen, 2002). The corporate policeman is in contrast an outsider who is only responsible for the reliability of financial information. This type of controller performs a more retrospective role and is dependent on the management. The controller plays hereby a mainly administrative function for the monitoring of project towards the project management (Riedijk, Tillema, & Moen, 2002).

Schäffer, Weber and Prenzler (Schäffer, 2001) also distinguished the same controller roles namely; disburdening and enhancing management. In the first role, the controller tries to support the management in all kind of ways and the second role is aimed at strengthening their management and to challenge and advise them in order to achieve the organizational objectives. Usually the controller appoints and provides improvements of management aspects with management measures. A risk is that the controller will become a (line) manager by taking over the tasks of the project manager (Anthony & Govindarajan, 2007).

The 'finance of the future controller' is an interpretation that is characterized by a variety of areas, ranging from operational to strategic and from specialization to integration. A controller at this stage is moving beyond the confines of a regular advisor, to take place on the seat of the project manager (Vaassen, 2003). Since the modern controller function is completed in many ways and is constantly subject to changes, the controller who shut matters beyond its currents scope, will not benefit from best lessons learned and is not able to stay employable in a dynamic environment (Vaassen, 2003).

2.7. Conclusion

This chapter provides the basis for the theoretical framework and maturity model. First the importance of applying management control and the control framework of Simons has been described, whereby an interaction between an instrumental and people oriented control mechanisms are important to achieve the strategic organizational objectives. Previous literature review by Van Aken has demonstrated that using too many instrument mechanisms correlate negative with project success. Too many instruments would undermine project success and achieving organizational objectives. Therefore key factors to obtain project control have been described. Management control systems should influence human behavior goal congruently. Finally, the controllers are responsible for the initiation, development and operation of management control systems.

3 Theoretical framework

This chapter describes the development of the theoretical framework and maturity model. In these models, the views of Anthony on management control systems, the levers of control from Simons and research of Hofstede are included.

3.1. Framework

In order to answer the sub questions and hypothesis, a theoretical framework has been developed, which is also the basis for the maturity model and includes instrumental and people oriented control mechanisms for specific project management control systems.

Based on the previous literature review, it is assumed that organizations which are equipped well with instruments such as project governance, project portfolio management, business case management, risk management and a result-oriented culture combined with the levers of control: boundary systems, diagnostic control systems, interactive control systems and belief systems are able to manage and obtain project control. It is also assumed that the control typology proposed by Hofstede: routine, expert, trial and error, intuitive, judgmental or political control, determines to what extent project control will be obtained. Projects which are defined in accordance with SMART objectives will lead to a better defined target, therefore organizations are more capable of obtaining project control. With effective adjustments of project results, the organization will also be able to obtain project control. In *figure 3* the theoretical framework of this research will be presented.

Figure 3: Theoretical framework

Levers of Control → Instrumental control mechanisms ↓	Boundary Systems (hard control)	Diagnostic Control Systems (hard control)	Interactive Control Systems (soft control)	Belief Systems (soft control)
Project governance *(H0 and H1)*				
Project portfolio management *(H0 and H1)*				
Business case management *(H0 and H1)*				
Risk management *(H0 and H1)*				
People and culture (Attitude and behavior) *(H1 and H2)*				
Control typology Hofstede	Routine, expert, trial en error, intuitive, judgmental or poltical control.			

Practical research has to provide more insights on the theoretical framework, sub questions, hypothesis and assumptions, which are set out below.

The answer to the first sub question, *which determinants are necessary to obtain project control,* will be based on the presence and operation of the instruments. The *null hypothesis (H0)* and the *alternative hypothesis (H1)* will be tested with self assessments combined with in-depth interviews on whether the use of instrumental control mechanisms is necessary to obtain project control.

The answer to the second sub question concerning, *the role of the human factor (people and culture) to obtain project control* will be based on the scores of the self assessments and the results of the in-depth interviews on the operation of the management control systems and the presence of a result-oriented culture, combined with the levers of control. The *second hypothesis (H2)* will also be tested, it investigates whether the people oriented control mechanisms (people and culture) are the foundation with the instrumental control mechanisms to obtain project control. During the in-depth interviews this will be critically traced.

The answer to the third sub question concerning *the role of the (project) controller in the initiation, development and operation of management control systems in a project based environment* will be based on the results of the in-depth interviews. The *third hypothesis (H3)* will also test whether the (project) controller should be positioned as an independent advisor to obtain project control. In addition, the roles and responsibilities of a controller from a practical and theoretical perspective will be analyzed and compared with each other.

3.2. Maturity model

The principles of the maturity model are decisive determinants, the levers of control which are proposed by Simons and the control typology of Hofstede should be balanced to reach a certain level of maturity. Each less mature component represents a weak link in totality to reach higher project results. This principle is also a very important starting point for the Capability Maturity Model and the INK-management model to determine where the most positive effects can be achieved. Insights on the basis of an integrated model like the INK-management model make clear which priorities should be adapted by the organization to achieve a higher level of maturity.

With this maturity model, determinants are provided with specific project management control systems to obtain project control in a project based environment. This maturity model gives insights

into the level of maturity of the organization and provides guidance for a well-equipped project management control systems. Subsequently, a higher level of maturity can be achieved. It is not necessarily that every organization should strive for the highest level of maturity. For many organizations a second or third maturity level will be sufficient to reach their aims. Achieving a higher level of maturity depends on the organizational type, objectives, investment decisions, willingness to change and the need of top management to achieve a higher level of maturity.

Based on the theoretical framework and the results from the multiple case study of all in-depth interviews and self assessments a maturity model for public organizations has been developed and simultaneously tested in practice. If necessary the determinants of the specific project management control systems will be adjusted into the maturity model. *Figure 4* shows the four levels of maturity.

Figure 4: Maturity model

Maturity model	
Level 1 *(H0)*	Management control systems tailored to an organization that does not work with projects routinely. The levers of control are present in design set up. The hard controls are more in place than the soft controls in the organization. Within the organization, the activities are not aimed at achieving a single innovation, improvement or organizational changes. The instrumental control mechanisms project governance, project portfolio management, business case management and risk management are present in design set up and equipped in the organization. These instruments are also seen as necessary to obtain project control. Because of the routine activities, not much creativity in the organization is needed to solve problems. Therefore the routine or expert controls are at the control typology.
Level 2 *(H0 and H1)*	Project management control systems tailored to an organization that works with projects. The projects are not temporary intended to achieve a one-time renewal, improvement or organizational change. Within the project organization the hard controls are present and leading. In view of the previous level of maturity, there is more attention paid to the interactive control system, whereby the organizational-wide learning process remains prominent. Besides the presence of the instrumental control mechanisms project governance, project portfolio management, business case management and risk management, are the project results

Level 2 (H0 and H1)	which are usually adjusted with the planning and control cycle of a project management methodology. The instrumental nature of the project management methodologies are seen as not sufficient to obtain project control. Because of the ambiguous objectives, lack of knowledge and the presence of a turbulent environment within the project, political control exist at the control typology. The desire of political control often comes from very high ambitions and additional requirements from the policy.
Level 3 (H2)	Project management control systems tailored to an organization that is project-based. Within the organization, the projects are intended to achieve a one-time renewal, improvement or organizational changes. Within the project organization, instrumental control mechanism, and the hard and soft controls of the levers of control are used. In addition, the interactive control systems, with intervention and interaction of project employees and application of best lessons learned become more important within the project organization. There is also more attention paid to the belief systems. The instrumental nature of project management methodologies are seen as not sufficient to obtain project control. In contrast the soft controls and culture along with the application of hard controls in the project management methods become more important to achieve the desired project objectives. Because objectives of projects are increasingly defined, activities of project become more repetitive. This means that the control typology, namely, intuitive, judgmental or trial and error, may apply to this project organization. The project organization is increasingly learning from control, through their own mistakes and shortcomings of human behavior in processes. Partly because of the experience within the project organization, projects become routine in nature and shortcomings can be reduced with a minimum, when an effective execution of the planning and control cycle is performed. In practice organizations are often not well-equipped so shortcomings of human behavior in processes can not be minimized. Moreover, the interaction between the hard controls, soft controls and a result-oriented culture to obtain project control is missing.

Level 4 *(H1 and H2)*	Mature project management control systems tailored to a project organization where projects are intended to achieve a one-time renewal, improvement and organizational change. Within the project organization there exist a combination of the instrumental control mechanisms and the leverage effects, of the levers of control, between hard controls, soft controls and a result-oriented culture. In addition, the behavior and decision making of project employees are consistent with the SMART defined strategic organizational objectives. Within the project organization the human factor (people and culture) is seen as the foundation for obtaining project control. The key to the success of a project lies in generating projects and addressing energy, commitment and creativity so that with less coordination of projects, more complex projects can be realized. By performing the activities in series of mini projects, the activities become more repetitive in nature and the organization continues learning, through its own mistakes and shortcomings in processes of human behavior. Projects tend increasingly have a routine nature. Weaknesses in processes can likewise be experienced within the project organization, but they can be reduced to a minimum with an effective adjustment of the planning and control cycle. There is no routine control, but a trial and error control as characterized by the control typology, since the project organization is learning from control, through their own mistakes and failures in processes of human behavior. In this context the interaction between creativity, innovation and control is essential.

The third hypothesis (H3) will be answered based on the results of the in-depth interviews. In this context, whether a relationship exists between the levels of maturity and the role of the controller in the operation of management control systems in a public project based environment is investigated.

3.3. Conclusion

In this chapter the development of the theoretical framework and maturity model has been described, which will be tested in practice and adjusted if necessary. In the next chapter the research results of the developed maturity model will be presented and analyzed.

4 Practical research

This chapter presents the research results of the review of the theoretical framework and maturity model. Practical research provides insights into how the participated public organizations obtain project control. In addition, research provides insight which instrumental and people oriented control mechanisms should be implemented in management control systems (in a public project based environment), for obtaining project control.

The first section will describe the restrictions of this research. In the second section, the research results of the various natures of project organizations with ICT , infrastructure and other projects are presented and analyzed. The third section describes the role of the (project) controller. Finally, the conclusion will be presented in the fourth section of this chapter.

4.1. Restrictions

Restrictions on performing this research could be evasive, strategic and socially desirable answers. In addition in-depth interviews are labor intensive methods and confidential information cannot be published. Moreover the truth and completeness of the data simply can not be verified. In order to reduce this limitation, all data will be anonymous and treated highly confidential. After this multiple case study each respondent will separately receive the research results.

When the added value is not visible to the respondents, it may affect the response and intended results of the in-depth interviews. To avoid this limitation, the added value will be communicated clearly to all the respondents, so that they are able to answer the question as recorded in the survey *(see appendix IV: self assessments public project organization).* By participating this multiple case study, respondents receive the research results and during the masterclass, they get the opportunity to learn and share failures and successes to obtain project control with other public project organizations.

The comparability of the various public project organizations and industry specific interpretation of control, definitions and jargon are complicating factors in the consistent application of the maturity model and determining the control typology proposed by Hofstede. In order to ensure objective answers, the controllers were asked to give a general outline of the planning and control cycle in their own organization. After this, they discussed their own roles and provided their experience on

obtaining project control. It is important to keep in mind that the empirical findings are based on the vision the controllers have over their own role. In order to reduce subjective judgements during the in-depth interviews, extensive attention must be paid to the underlying reasons and mindset of the respondents.

Due to the use of different interval scales *(see figures 5 and 6)* by respondents in the self assessments, the differences are not absolute with respect to the zero point. A reservation in the interval score for completing it properly had to be made so that the analysis of eventual connections will be possible. For possible correlations between the self assessments and the in-depth interviews limitations of statistical nature has been considered. Due to the limitation of a few observations and interpretations of the respondents, the results are not generalizable and no specific statements on the conclusions can be drawn.

Finally, it is difficult to get a general accepted conclusion from the analysis, because of differences among the heterogeneity of the type of projects, project organizations and their environment. When discussing the comparability and interpretation of the self assessments, subjective judgments are reduced as much as possible with the elaboration of the in-depth interviews and the maturity model.

4.2. Research results

This section describes the research results and the analysis of the multiple case study *(see appendices V to X)*. In the first sub section, the results of the self assessments will be presented. The second sub section will present the results of the levels of maturity of the public project organizations. In the third sub section, the decisive determinants and determinants of failure will be described. Once these determinants are described, the fourth sub section will analyze various types of project organizations. In the fifth sub section, possible relationships between the statements on project control and the levels of maturity will be examined. The sixth sub section will present the possible relationships between instrumental control mechanisms and the levels of maturity. In the seventh sub section, the possible relationships between the levers of control and the levels of maturity will be discussed. Finally in the eight sub sections, possible relationships between the control typology proposed by Hofstede and the levels of maturity will be discussed.

4.2.1 Self assessment statements

The self assessments *(see appendix III)* shows that public project organizations are often using Prince 2' or a derivative project management methodology. Respondents experience visible effects within the project organization after the introduction of a project management methodology.

The results of the respondents who responded to the nine statements of project control are presented in *figure 5*.

<u>Figure 5: Results statements on project control</u>
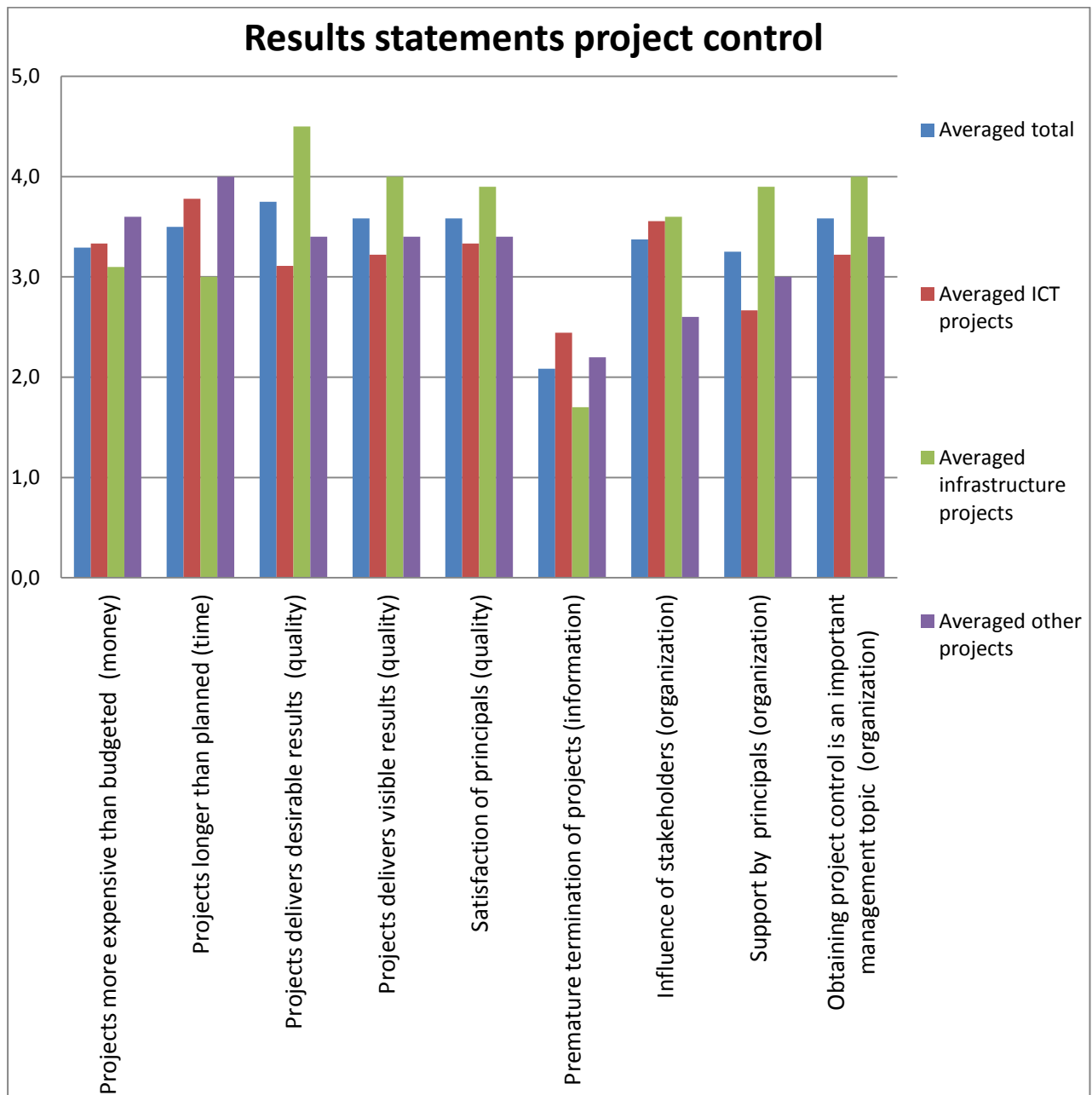
In the above figure were the respondents asked to reply to nine statements on project control *(see appendix III)* with an interval scale from 1 to 5.[2]

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[2] The following interval scale was used 1: strongly disagree, 2: disagree, 3 : neutral/ no opinion, 4: agree and 5: strongly agree, a completely agreement with the statements on project control.

The results which are presented in figure 5 demonstrates, that the overall respondents give varied response on the statements whether projects are more expensive or take longer than originally was planned. On average most respondents choose the neutral response. In addition, projects are often prematurely terminated. In this context, it may be noted that infrastructure projects seems to be more likely better managed than other types of project organizations. At infrastructure projects the results are visible and the desired results are delivered. Also principals and contractors are satisfied with the results of projects and obtaining of project control is an important topic on the agenda of the management according to the other types of project organizations. In addition, infrastructure projects do not appear expensive and do not take longer than was originally planned, compared to the ICT projects in this study. Possible causes are: optimism, deliberately underestimating revenues and expenses for launching and funding the projects and getting (an unintentionally) low estimate of costs by principals or contractors. Contractors may have an interest to earn as much as possible from additional work and make changes/adjustments in projects that has not been previously recorded and discussed in preparing the contract. The principals find it in contrast important to launch the project, deliver the agreed quality and reduce negative publicity around the secretary of state. This causes conflicts between those two parties and has a negative impact on obtaining project control.

Figure 5 shows the statements on project control. The scores of the instrumental control mechanisms and result-oriented culture are presented in *figure 6.*

Figure 6: Results instrumental control mechanisms
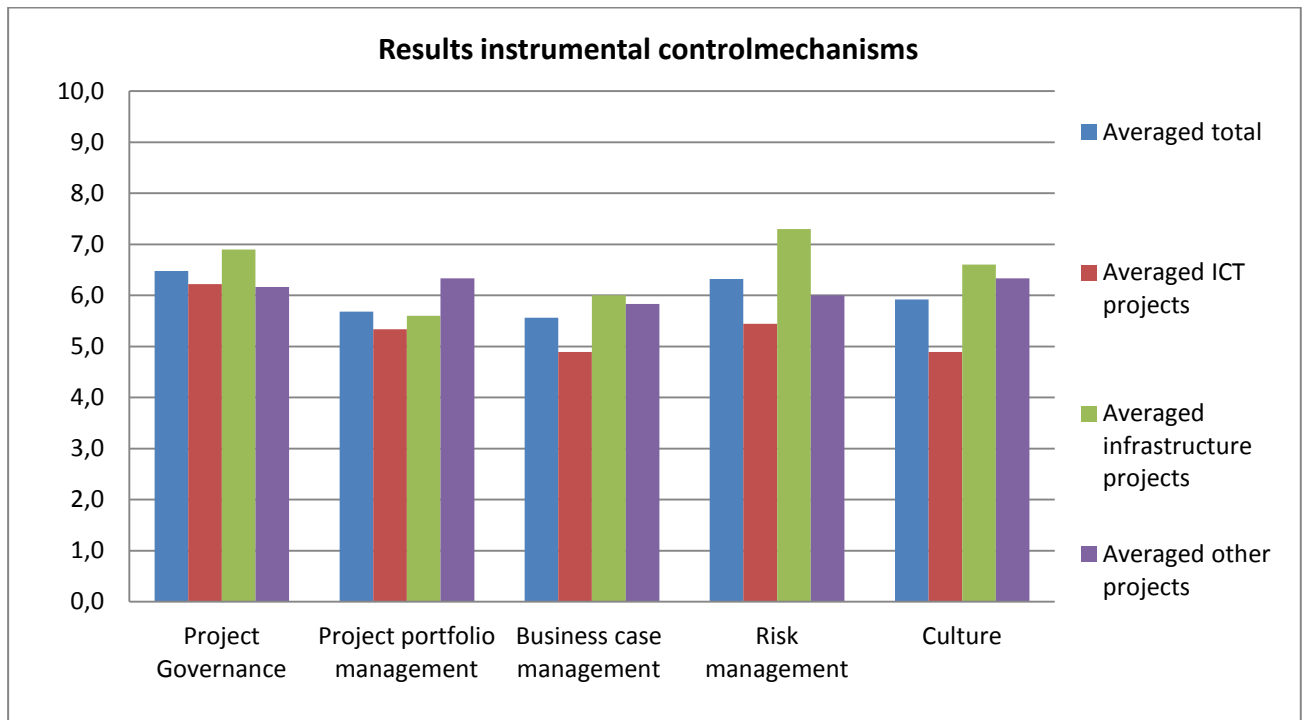
In the above figure were the respondents asked to assess the instrumental control mechanisms on an interval scale of 1 to 10 *(see appendix III.*[3]

The results which are presented in figure 6 demonstrates, that the overall on average the operation of instrumental control mechanisms are sufficiently assessed within the public project organizations. Infrastructure projects have a better score on the field of risk management than the other type of project organizations. In addition, is the operation of a result-oriented culture missing at ICT projects.

4.2.2. Results levels of maturity

This section will present the results of the self assessments *(figures 5 and 6),* the in-depth interviews *(see appendix X)* with the maturity model and the final level of maturity per type of project organization *(see appendix VIII)*. These results are all based on the results of the self assessments and the in-depth interviews. After the levels of maturity are presented, these results will be analyzed and compared to the scores of the self assessments and in-depth interviews of other respondents.

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[3] Hereby stands the interval scale of 1: indicating that instruments are not well defined and a score of 10: indicating that the instrumental control mechanisms project governance, project portfolio management, business case management, risk management and culture are well defined and calibrated into the public project organizations.

Figure 7: Maturity levels of public organizations
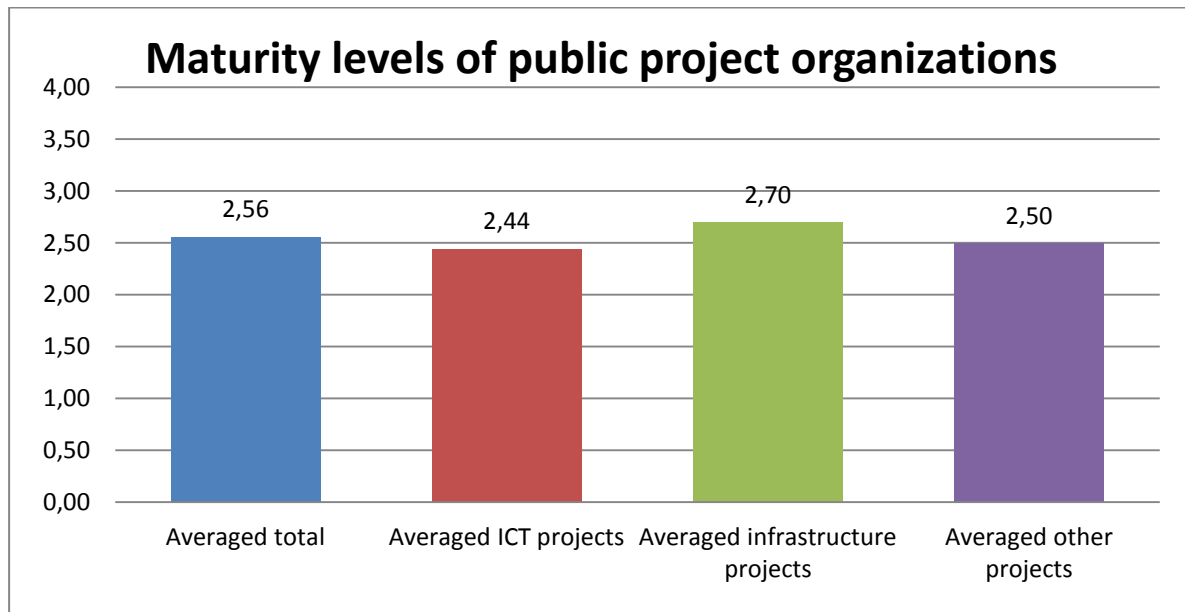
In the above figure the results of the maturity levels of the public project organizations, based on the results of the self assessments and in-depth interviews , are presented with an interval scale from 1 to 4.[4]

The results as presented in *figure 7* demonstrates, that the overall average maturity of project control at different type of project organizations lies between the second and third level of maturity. This means that there is in general awareness of project control within the public project organizations. In addition, the interactive control systems with intervention and interaction of project employees and application of best lessons learned becomes more important within the organizations. General observations from in-depth interviews confirm this view.

In addition, to *figure 7* it can also be noted that the score on infrastructure projects are on average higher than other project organizations. Because of the heterogeneity of the project organizations the score of infrastructure projects is not significantly better than other project organizations. Therefore no specific statements can be drawn in this context. However some general observations from in-depth interviews confirmed this view that compared to the other type of project organizations the interactive control systems becomes more important and more attention is paid to

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[4] Hereby stands the interval scale of 1: to report that the first level of maturity is available and a score of 4: to report that the fourth (mature) level of maturity is available at public project organizations.

the belief systems. This means that organizations with infrastructure projects are moving towards the third level of maturity.

4.2.3. Results in-depth interviews

The decisive factors to keep projects manageable are good defined business cases in which objectives of projects and requirements and functions of the end result are defined SMART. Moreover, project managers, employees and (project) controllers need to be experienced and motivated. The (project) controllers need to have an independent advisory role from the project management. Finally, there needs to be more attention and commitment from the management to obtain project control. The results of the in-depth interviews have indicated that the respondents want to see development on the fields of project portfolio management, business case management and sharing best lessons learned. The role of the (project) controllers is completely different for each project organization. Respondents of the organizations with a third or fourth level of maturity are in line with the theory of enhance management. The (project) controller should therefore not be a part of the project team and should not be positioned hierarchical to the project manager. If the project manager needs expertise in control, this can be completed by an officer. This could be done for example by a project secretary. Because of the lack of control, expertise of these officers may not be optimally obtained. Experienced and motivated (project) controllers are required to obtain an optimal operation of management control systems in a project based environment.

The respondents have provided the following factors of failures whereby objectives of projects are not achieved: very high ambitions and additional requirements from the politics. This increases the risks of failures of projects and obtaining project control becomes more difficult, because little to no influence can be exercised on circumstances of additional requirements and divergent interests. In addition, lack of resources and time or a realistic plan of the defined ambitions was mentioned by respondents. Often there is no transparent decision making process within the organizations and there is no direct interest in (financial) accountability and transparency. The complexity of the effects of interventions in projects, which are important to obtain project control, is also unkown. Bent Flyvbjerg distinguished structural causes such as: optimism, deliberately underestimating of revenues and expenses in order to launch and finance projects. Often projects are too optimistically estimated in money and time because people are accustomed to be guided by ambitions and positive imagination of project success. If it fails, they will try to shift the risks to other parties. Eventually this means more costs to the taxpayer.

4.2.4. Analysis of project organizations

The results as presented in *figure 7*, demonstrates that infrastructure projects are moving towards the third level of maturity. In this context, intention, interaction and sharing best lessons learned becomes important to obtain project control. In addition, the generation and addressing energy, commitment and creativity of project employees becomes more important in infrastructure projects to obtain project control, as it is with other types of project organizations. It is remarkable that a few project organizations with mainly infrastructure projects have learned from their own mistakes and shortcomings in processes of human behavior. Over the years project organizations with mainly infrastructure projects have seen the human factor, attitude and behavior of project employees, as the foundation for obtaining project control. Within these organizations the emphasis lies on the belief and the interactive control systems to launch and create an organizational wide learning development, through screening of project employees on their competencies in advance of the selection process, in order to obtain project control. In addition, by performing series of mini projects the room for movement, interpretation and action alternatives remain important to those who are subjected to controls within their project organization.

A good example of an infrastructure project that was more expensive than budgeted and took longer than initially was planned was the 'Blunderput' in the municipality of Rotterdam. The 'Blunderput' was a painful realization for the organization. It could no longer continue as it previously did. This has led to the development of a project management methodology with a combination of Prince 2' and creating projects that have adapted to the organizational culture. Management of the organization also created space for human talents, an interaction has been sought with motivating and challenging talents of project employees, and serious attention has been paid to the benefits of human intelligence. The introduction of a project management methodology, SMART defined objectives and a creation of a result-oriented culture within the organization has been an important contribution in obtaining project control.

The results of the multiple case study demonstrates, that infrastructure projects are more manageable than the other types of project organizations. Starting points are perhaps relationships with measurability, visible results, pride, culture and thus the belief systems. It was also found that public organizations with infrastructure project with a higher maturity level are frequently performing series of mini projects. In this context, everyone in the project team will share responsibility to deliver the end results quickly, efficiently and effectively. In addition, the infrastructure projects use Design, Build, Finance and Maintainance contracts (DBFM contracts; a

combined form of business case management and risk management) which stipulate that the principal is accountable for the design and execution of projects. In this context, the principal, the government, is responsible for funding the projects and the responsibility is delegated to a contractor, because the organizations of the principal usually have insufficient capacity or experiences to execute the projects by themselves. With ICT and other projects, responsibilities are delegated to the principal, the secretary of state. The principal is therefore responsible for the design and the agency, the executive departments, and the execution of projects. When the principals and contractors have different interest the scale of large ICT and other projects become too complex to obtain project control.

The instrumental control mechanisms are on average well represented by all respondents. The implementation and adjustment of the planning and control cycles differ within the various public project organizations. Some are further ahead than others. The instrumental control mechanisms together with boundary and diagnostic control systems are leading in ICT projects. Within the infrastructure projects, risk management is more positively assessed than the other types of project organizations. Project portfolio management has only a higher score at the other projects than the other type of project organizations. Furthermore, there are the instrumental control mechanisms along with the levers of control; there are also boundary and diagnostic control systems, and there is more demonstrable attention paid to interventions, interaction and sharing of best lessons learned in other projects.

4.2.5. Analysis of the relationship between project control and levels of maturity

Figure 8: Relationship statements on project control and levels of maturity

Interval scale 1-5 whereby 5 means "completely agree"										
Maturity levels	**Pop-ulation**	Projects more expensive than budgeted **(money)**	Projects longer than planned **(time)**	Projects delivers desirable results **(quality)**	Projects delivers visible results **(quality)**	Satisfac-tion principal **(quality)**	Premature termination of projects **(information)**	Influence stakeholders **(organization)**	Support by principals **(organizati-on)**	Obtaining project control important management topic **(organization)**
Level 1	3	4,00	4,33	3,33	4,00	3,67	2,67	3,33	3,00	2,67
Level 2	8	3,29	3,43	3,57	3,43	3,57	2,00	3,43	3,57	3,29
Level 3	11	3,10	3,70	3,8	3,50	3,5	2,20	3,40	3,10	3,70
Level 4	3	3,00	2,00	4,67	4,00	4,00	1,33	3,67	3,67	4,67
Total	25									

In the above *figure 8* the results of the nine statements on project control *(see appendix V, VI and VIII)* and its level of maturity of the different types of public project organizations are presented.

The results as presented in *figure 8* demonstrates, that the overall results of the statements on project control *(see appendix V, VI and VII)* are declining when the level of maturity increases. Organizations with a higher level of maturity are more able to finish the project within the budget *(question money)*. In addition, the visibility of the results *(question quality)* and the attention of the management to obtain project control *(question organization)* increases. It can be noted that early termination *(question information)* does rarely appear at organizations with a higher level of maturity. Moreover, the desired results and satisfaction of principals have on all levels of maturity more or less the same score. This is remarkable, since this means that despite a less adequate form of project control, the desired outcome can be achieved at the first level of maturity.

In an analysis of possible correlations between the reviews of the statements on project control *(see appendix III)* and the level of maturity, the limitations of statistical nature are considered. [5]

Projects that take longer than originally planned have a negative correlation (beta coefficient of -0,351 and a significance of 6,20%) with the level of maturity. When projects take longer than they originally was planned, this leads to a lower level of maturity. This is in line with previous assumptions, because it was expected that a higher response of the statement on projects which takes longer than originally planned would show a lower level of maturity. In order to achieve a higher level of maturity, it is important that projects are delivered on time.

The reviews on the delivery of the desired project results have a negative correlation *(*beta coefficient of -0,403 and a significance of 9,60%) with the level of maturity. This is not in line with the previous assumptions, because it was expected that a higher reply of the statement on providing the desired project results would show a higher level of maturity. Statistical analysis shows the opposite *(see appendix IX).*

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[5] Due to the limited number of observations, no concrete statements can be made on the statistical nature which is presented in *appendix IX.*

4.2.6. Analysis of the relationship between instruments and levels of maturity

Figure 9: Analysis of the relationship between instruments and levels of maturity

Interval scale 1-10 whereby 10 means "excellent"						
Maturity levels	Population	Project governance	Project portfolio management	Business case management	Risk management	Culture
Level 1	3	2,67	3,67	4,33	4,33	2,33
Level 2	8	6,57	5,14	4,43	6,57	5,43
Level 3	11	6,91	6,55	5,91	6,36	6,91
Level 4	3	8,33	6,67	8,00	8,00	7,33
Total	25					

In the above figure the results of the instrumental control mechanisms *(see appendix V, VI and VIII)* and its level of maturity of the different types of public project organizations are presented. In this context, a reservation has been made on the interval scale so an analysis of correlations will be possible.

The results as presented in *figure 9* demonstrates, that the overall score increases by the levels of maturity with exception of the evaluation of risk management. The average score for example on project governance with organizations with the first level of maturity is 2,67, while organizations with the fourth level of maturity have a score of 8,5. There is a visible relationship between the structure and operation of the instrumental control mechanisms and the levels of maturity. In an analysis of possible correlations between the scores of the instruments and the levels of maturity, the limitations of statistical nature are considered. [6]

The score of project portfolio management has a positive relation (beta coefficient of 0,1603 and a significance of 7,00%) with the level of maturity. This is in line with previous assumptions, because it was expected that a higher score on project portfolio management would lead to a higher level of maturity.

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[6] Due to the limited number of observations, no concrete statements can be made on the statistical nature which is presented in *appendix IX.*

4.2.7. Analysis of the relationship between instruments, statements project control and levels of maturity

In an analysis of possible correlations between the scores of the instruments, reviews of the statements on project control and the level of maturity, the limitations of statistical nature are also considered.[7]

A positive score on the instruments and reviews of the statements on project control has a strong positive linear relationship (with a Pearson square of 0,913) with the level of maturity. A higher score on the score of instruments and statements on project control will most likely mean a higher level of maturity. In addition, there is a strong linear relationship is between project governance, risk management, culture and the reviews of the statements on project control *(see appendix IX)*. Only for project governance, a significance relation (with a significance of 5,30%) can be made with the reviews of the statements on project control. Positive reviews of the statements on project control have a strong linear relationship (with a Pearson square of 6,26%) with the score of project governance. Therefore positive reviews of the statements on project control will most likely lead to a higher score on project governance.

The results of the multiple case study suggest, it seems likely that business case management and risk management seem have a direct influence on the project results. Furthermore, it can be concluded that project governance, project portfolio management and a result-oriented culture have likely an indirect influence on the project results. The results of the significance demonstrates, that there can not be identified a direct significance relationship between business case management, risk management and a result-oriented culture for obtaining project control. But as in case as the levels of control, it is here also about the interaction between the instruments with a leverage effect between project governance, project portfolio management, business case management, risk management and a result-oriented culture.The leverage effects on the instruments should reinforce each other and allow for strategic organizational objectives. Therefore organizations have to think about the deployment of the instruments and the interaction between them, because one lever has non to little influence for obtaining project control.

Linear regression between instruments and statements has provided a significance relationship between project portfolio management, business case management and the reviews of the statements on project control *(see appendix IX).* Positive reviews of the statements on project control will have a

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[7] Due to the limited number of observations, no concrete statements can be made on the statistical which are presented nature in *appendix IX.*

little relationship with project portfolio management (with a Pearson square of 0, 36) and business case management *(with a Pearson square of 0, 40).* Further analysis shows that obtaining project control by management as an important topic on the agenda together with the use of instruments are crucial in obtaining project control.

An organization with a higher level of maturity is expected to achieve consistent results in various aspects of project control. Three organizations have the fourth level of maturity, therefore it is best to test this principle on them.

The population size of the second and third level of maturity should give consistent results because their populations are larger than the other levels of maturity. The higher levels of maturity have a balanced framework for their organization and this should primary lead to more mixed project re-sults.

4.2.8. Analysis of the relationship between levers of control and levels of maturity

At all levels of maturity the boundaries of the **boundary systems** are present and possible risks are hedged to a certain level. In essence, knows the organizations the movement of employees to represent into their structure.

The results of the **diagnostic control systems** suggest, that organizations which are classified in the lowest two levels have more difficulty to design and use this control system. On the *first level of maturity,* the levers of control are usually in design set up. Organizations at this level know what they need, but identifying and intervening the actual delivery of the requested deviations from the standard views must be addressed. On the *second level of maturity,* it often lacks of a proper methodology for the instrumental control mechanisms. For example the information is available, but a coherent report will not be achieved or with a lot of difficulty. In addition, for example a risk log is maintained, but it does not contribute to obtain project control. On the *third level of maturity,* the equipments of this system are more successful, the employees are better informed about the progress towards the objectives of projects. It also appears that frequently is reported and centrally is assessed on the third level of maturity. On the *fourth level of maturity,* the diagnostic control systems are strictly used in a controlled way. The organizations on this level doesn't work only with a project management methodology (like Prince 2'), but they also analyze how project plans relate to the strategic organizational objectives.

The results of the ***interactive control systems*** demonstrates, that on the first level of maturity, the design on this control system is generally missing. On the second and third level of maturity this control system is set up in design. Having a good interaction between the top management and the rest of the organization is essential. Based on the first and second level of maturity, the interaction with top management is missing. It becomes clear that the level of maturity of an organization represents the opportunity to communicate. In case of the organizations on the first level of maturity, the benefit lies on the ability of employees to judge and confront each others on their performances with regards to bad projects. In addition, knowledge is lost because there is no interaction on the lessons learned from previous projects on how to follow the organizational strategy. On the *second level of maturity,* is the project manager usually responsible for delivering the project results but often he does not receive very much support and feedback from the principal and other stakeholders. Prior to the project, consultations are hold, but during the project, the project manager is solely responsible for the completion of successful projects. Organizations on the third and fourth level of maturity have in particular a clear hierarchical structure, allowing it to communicate or to make changes in the process to achieve strategic objectives. Escalations take place through a predetermined path that can lead to undesirable developments of adjusting or temporarily stopping a project.

The results of the **belief systems** suggest, that the maturity of an organization is about the faith of employees in the organizational strategy and the way projects are managed. Often the organizational values come down to the existing organizational culture, which provides a relation with the boundary systems. For example, if an organization is focused on providing specialist services and employees with little financial knowledge are present, making (financial) reports are considered as a nuisance and unnecessary experience. On the other hand, the lack of faith in reports showing progress does not mean that employees are not involved in the project they are working on. In many cases, the skills and commitment of the project employees for the desired results were essential, even when they are not fully in control of the projects. Therefore skills and commitment of project employees are very important to obtain project control.

4.2.9. Analysis of relationship between control typology of Hofstede and levels of maturity

Figure 10: Analysis of relationship between control typology of Hofstede and levels of maturity

Maturity levels	Population	Routine control	Expert control	Trial and error control	Intuitive control	Judgmental control	Political control
Level 1	3						100%
Level 2	8		13%	25%	25%		37%
Level 3	11			18%	9%	18%	55%
Level 4	3			67%	33%		
Total	25						

In the above figure the results of the control typologies which were proposed by Hofstede, based on the results of the in-depth interviews, are plotted against the corresponding levels of maturity.

The results as presented in *figure 10* demonstrates, that the project organizations are not performing any routine based work. So all public organizations are working on project basis and have a project organization. In addition, it can be noted that the first level of maturity is characterized with political control, with ambiguous goals and effects of interventions which are largely unknown within the organization.

The second level of maturity shows a varied view. Here by various kinds of project environments are mixed. At the third level of maturity most of the organizations are characterized by political control. Except in the fourth level of maturity with mainly infrastructure projects, political control does not appear. The results of political control are in line with the theory. Projects are difficult to manage, as project control is dominated by less clear objectives of projects. The high ambitions and additional desires from the politics also play an important role in obtaining project control. Possible causes of this are conflict of interests and values, lack of knowledge and the presence of a turbulent environment.

The second and third level of maturity demonstrates, that there are no visible relationships between the control typology and the level of maturity, because political control occurs at both levels. The analysis of the fourth level of maturity shows that objectives which are defined SMART, projects which are evaluated, knowledge of projects that will be shared and experiences which are used in future projects and the measurement of series of mini projects, increase the manageability of projects. The projects with a political control can be managed despite their dynamic political environment. The political environment complicates the controllability. Using instruments and the

levers of control increases manageability in a political environment. Despite a political environment project control can be obtained.

The upcoming budget cuts and ambitious objectives within project organizations, make it necessary to define project objectives SMART and have a proper project governance structure because of the political control. In this context, the role of all stakeholders should be documented and communicated, to achieve the objectives of projects through intervention, interaction and sharing of best lessons learned. In addition, performing series of mini projects are important to find the effects of interventions and to reduce shortcomings in processes of human behavior, with an effective adjustment of the planning and control cycles to a certain minimum. Hereby the control typology of trial and error control becomes increasingly more important combined with a more result-oriented culture and the belief systems to obtain project control.

Figure 11: Results control typology Hofstede within project organizations
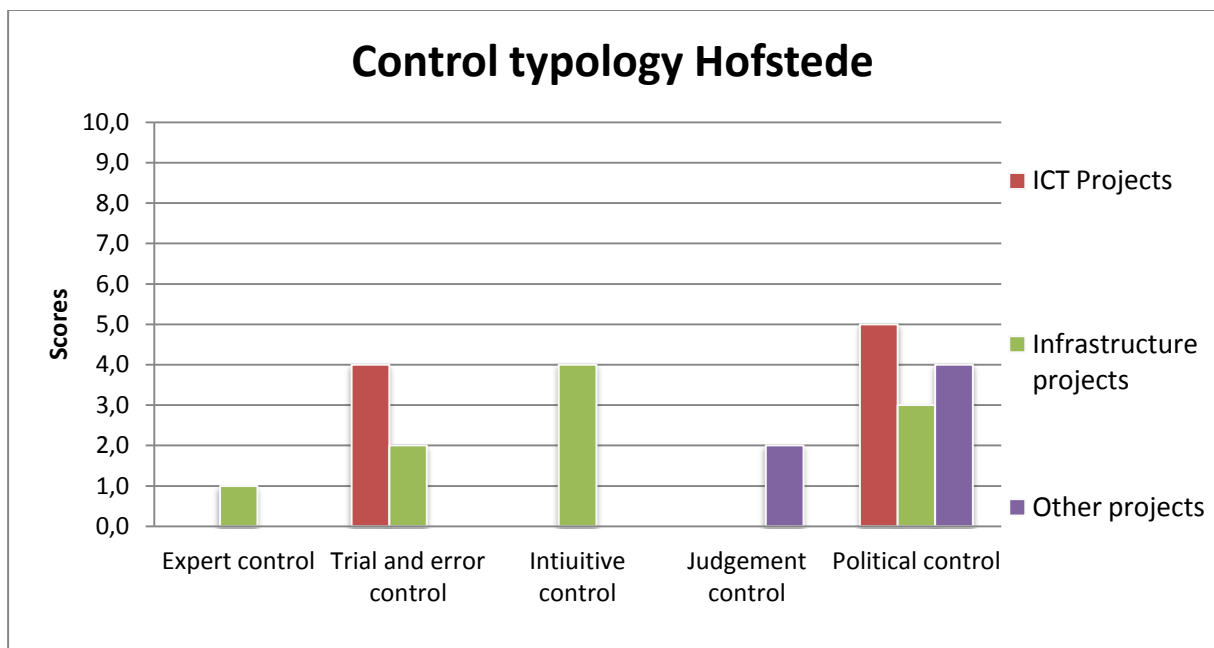
In the above figure the results of the control typology, based on the results of the in-depth interviews, are presented per type of project organization.

As the results which are presented in *figure 11* inidicate, it is difficult to draw a clear conclusion on the control typology of Hofstede. This is because of the heterogeneity of the project organizations

and the type of projects, which make drawing a general conclusion complicated. It may be noted that the political control often negatively affects the manageability of public projects.

In an analysis of possible correlations between the levels of maturity and the typologies of control, the limitations of statistical nature are considered. [8] Based on the analysis of the results of political control, it can be concluded that there is a significance negative relation *(beta coefficient of -0,750)* between the level of maturity and the political control in terms as control typology. This means that a political control has more likely a negative influence of obtaining project control. To obtain project control to an optimum, it is essential to define objectives SMART, perform and monitor series of mini projects, apply the leveraging effects of the control framework and create a result-oriented culture whereby the project employees can optimally contribute to achieve the strategic organizational objectives.

4.3. Role of the (project) controller

Figure 12: Analyses of positions of (project) controller and the levers of maturity

Role of the (project)controller			
Maturity levels	Population	Disburdening management "supporting management"	Enhancing management "challenging management"
Level 1	3,0	1,0	2,0
Level 2	8,0	3,0	5,0
Level 3	11,0	2,0	9,0
Level 4	3,0	0,0	3,0
Total score	25,0	6,0	19,0

In the above figure the position of (project) controllers, based on the results of the in-depth interviews, are plotted against the levers of maturity. In this context, the role of the controller distinguished by Schäffer, Weber and Prenzler has been taken into account.

The results as presented in *figure 12* demonstrates, that the controllers at a higher level of maturity are supporting the project management to a lesser extent and are challenging the top management for obtaining project control. The controller performs at a higher level of maturity when he functions as independent sparring partner of the project manager and top management. This gives the (project) controller for example the opportunity to solicited and unsolicited advice to the top man-agement or inform about deviations in projects or projects that needs more attention. Project con-

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[8] Due to the limited number of observations, no concrete statements can be made.

trollers at a higher level of maturity are not hierarchically positioned to the project manager and the project itself. This completes the implementation of the project which is different than the actual controller implementation of financial controllers, who are often responsible for contributing efficiency and improvement in tracking the financial figures.

The results of the multiple case study demonstrates, that project control is properly defined and calibrated at organizations with a higher level of maturity. A good (project) controller has knowledge of the management tools and people oriented control mechanisms *(levers of control)*. He is able to function in management control systems in a project based environment and is capable to advise the management on improvements on the management control systems. The (project) controller that wants to contribute to processes of changes is looking to the balance between control and innovation and tries to apply the control framework of Simons. The (project) controller has in addition an independent evaluation role and no exculpatory or supportive role in relation to the project manager. The (project) controller increasingly has the role of a business and sparring partner to the project managers and top management. This is line with the previous literature review on enhancing management as discussed by Schäffer, Weber and Prenzler.

During the in-depth interviews the respondents discussed the broadening of the controller function, where the controller evolves from a supporter on sidelines trying to exert influence his influence as a strategic player to become part of the management. The role and function of the (project) controller varies in different project organizations. This variation is related to the causes of development of controller functions and personal characteristics of the (project) controllers. The (project) controller as a business partner does not only mean having an authority on strategic level participation in the management, but also having the necessary information available for all decision making and solving current issues. Besides (project) controllers must be an independent conscience of the organization, but also help in process based thinking and its socio-psychological sense. This requires from the (project) controllers to bring relevant players together and experiment with possibilities of effective interventions to achieve the strategic organizational objectives.

4.4. Conclusion

Based on the analysis of self assessments, in-depth interviews, and levels of maturity, it can be concluded that higher score and review on using and operating instrumental control mechanisms and statements on project control are more likely to lead to a higher level of maturity. Organizations

in the fourth level of maturity score significantly better on all aspects of project control and are aware of the belief and interactive control systems. The analysis of the research questions and hypothesis are as follows:

1) Which determinants are necessary to obtain project control?

The results of the multiple case study shows that the instrumental control mechanisms project governance, project portfolio management, business case management and risk management, contribute to obtaining project control. In addition, multiple case study shows that the application of DBFM-contracts (combined form of business case management and risk management) obtain project control better in infrastructure projects compared to the other type of project organizations.

Results from the multiple case study demonstrates, that the respondents without clear and substantiated business case projects are no longer able to start projects. In addition, from the start of the project, the project objectives, milestones, specifications of costs need to be well-defined and properly be monitored by the (project) controller. Moreover, the role description of the principal needs to be more specifically defined and monitored, with a well-equipped process of project governance within the project organizations.

(H0) The use of instrumental control mechanisms within a public project based environment is necessary to obtain project control.

(H1) The use of instrumental control mechanisms within a public project based environment is not necessary to obtain project control.

The results of the levels of maturity demonstrates, that the instrumental control mechanisms are not insufficient to obtain project control. Therefore the first hypothesis *(H1) can be accepted and* the null hypothesis *(H0) can be rejected.* In addition this also confirms the study by van Akens, since few instruments and tools are required to achieve project success. In order to achieve project success, project must be addressed uniquely. In addition, project control benefits from empowerment, creativity, innovation and space for human talents. Issues of motivating and challenging the use of human talent and intelligence need more attention. Therefore soft controls become more important for obtaining project control.

2) What role does the human factor (people and culture) play in obtaining project control?

The results of the multiple case study demonstrates, that the human factor is a decisive factor to obtain project control.

Project managers needs to be experienced and motivated. Project controllers must have an independent advisory role and obtain the compliance of project management control systems. Controllers must initiate, develop and implement project management control systems. Attention from management, as an important management topic to obtain project control, increases the chance of project success. Interactive feedback systems need to facilitate the interaction between top management and the other (project) employees in order to reduce strategic organizational uncertainties to a minimum. Finally well-developed belief systems obtain motivated (project) employees who are needed to achieve the strategic organizational objectives.

(H2) The people oriented control mechanisms (people and culture) are the foundation for obtaining project control in a public project based environment.

The results of the multiple case study demonstrates, that the people oriented control mechanisms (people and culture) are increasingly the foundation, along with an interaction of the instrumental control mechanism, to obtain project control within a project based environment. This allows accepting the second hypothesis *(H2).*

3) What is the role of the (project) controller on the initiation, development, and operation of management control systems in a project based environment?

In order to develop, initiate and operate anagement control systems in a project based environment, (project) controllers must have an independent, objective, critical role and solution-oriented role. In addition, the (project) controller should minimize the project support to project manager in order to realize the project within predetermined frame. The (project) controller should be the conscience of the project manager and top management.

(H3) The (project) controller should be an independent advisor and should therefore not be positioned hierarchically on the project.

The results of the multiple case study demonstrates, that the (project) controller should be the business and sparring partner of the project manager and top management. In addition, the (project) controller must not be positioned hierarchically to the project manager and in the project, in order to reduce divergent interests. The (project) controller must have an independent and evaluative, and not an exculpatory or supportive role to the project manager. The (project) controller should not be misused for supporting the project manager. The project controller increasingly performs the function of the business and sparring partner of the project manager and top management. This is in line with the previous literature review on enhancing management as discussed by Schäffer, Weber and Prenzler.

5 Conclusion and recommendations

In this chapter, conclusions of the research and recommendations for future research to obtain project control for public project organizations are described.

5.1. Conclusion

The principle question of this research is:

Which instrumental and people oriented control mechanisms should management control systems in a public project based environment exist?

Organizations are used to initiate many management control systems. All the organizations are currently working on the development and operation of their management control systems. Some organizations are further than others in the design set up and the operation of the instruments and management control systems. Generally the control mechanisms are instrumental and they are not sufficient to obtain project control.

Based on the results of the multiple case study, it can be concluded that organizations with a result-oriented culture and strong belief systems are more able to manage and obtain project control. A result-oriented culture can be achieved by controlling the compliance of agreements. In addition, project employees need to address, judge and confront each other more specifically on bad project results. Intervention, interaction and sharing best lessons learned are factors which leads to project success and create a result-oriented culture. Some elements are already in operation within the organizations. Within the organizations there is increasingly more attention paid to competences (through recruitments, selection processes, performance and assessment interviews, and trainings) of project employees, which is in line with the organizational strategy.

The interaction between the instrumental control mechanisms project governance (principal-agent, interactive), project portfolio management, business cases, risk management (diagnostic) and the levers of control: belief, boundary and culture with leverage effects are important factors to obtain project control through management control systems. In this context, the behavior and decision making process of project employees needs to be consistent with the strategic organizational objectives.

The results of the multiple case study suggest, that infrastructure projects are more likely better to control projects as is the case with the other types of project organizations. Starting points are perhaps the relationship between measurability, visible results, pride and thus culture (belief systems). Contractors basically want to earn as much as possible from the projects and the principals want to launch, finance the projects and avoid negative publicity around the secretary of state. This causes divergent interest between both parties. Because of the divergent interests between principals and contractors, where projects needs to be delivered within the intended money, time and quality, no conclusions can be made on the starting points.

Finally, it can be concluded that the participated project organizations have attracted the criticism of the Court of Audit (Algemene Rekenkamer) on the (partial) failure of ICT projects of the Dutch government. Project control becomes increasingly professional and project delivers increasingly the desired results. The management aspects, i.e., money and time remain important points of attention. Because of the drastic budget cuts not only time, but also money remains an important point of attention to deliver projects without unnecessary overruns of time.

5.2. Recommendations

Based on the results of this multiple case study, the following general recommendations are offered to obtain a more professional project control:

First of all management needs to provide the core values of the organization that will be used.

Secondly, the management should indicate the boundaries within which the employees should remain.

Furthermore interactive control should aim to establish the communication between the top management and the other employees of the organization, with the aim to launch organization-wide learning process. Using a management methodology that has been determined by management helps to connect the core values and boundaries and also facilitates communication with a common conceptual framework and uniform management processes.

Performing an evaluation of the performances of projects is necessary to the interactive control systems to find better procedures in the execution of future projects. This enables an optimal project control.

Uniformity of project objectives, measurability of outcomes, awareness of the effects of interventions are critical factors for the establishment of a good business case and make a results-oriented culture possible. Uniformity, measurability and awareness of effects of interventions can be increased by performing several series of mini projects. Because of this, less time will pass before any shortcomings and effects of interventions are visible in processes of human behavior. In addition, the organizations need to take care that the projects are aligned with the strategic organizational objectives and are performed according to the preconditions. The instruments project portfolio management, business case management and risk management are necessary instruments that need to be tightly adapted on the organization. Escalation mechanisms needs to be tuned and communicated clearly in advance to all concerned stakeholders (governance structure) so that timely intervention of effects are possible.

The (project) controller should be positioned independently on the project. The project controller has no supportive role towards the project manager, but is in fact an independent business and sparring partner of the project manager and top management.

Because the use of many instruments correlate negatively and the work style correlates positively with project success, less instruments are required to achieve project success. Experienced and motivated project managers, employees and (project) controllers are necessary to obtain project control. The human factor is in fact the foundation to obtain project control.

Finally change in management is essential to obtain the improvement of a professional project control. Change management is an important issue within organizations. It deals about objectives that have to be realized. There should be a relation with the organizational strategy with regards to direction and changes as movement. Enterprise suggests movement, dynamic, added value, from position to objective pursuit. It is about taking others and working together. The term enterprise in this context indicates integrality within the whole (Ten Have, 2005).

Public organizations should make changes at the management level and in the management style to obtain project control. Nowadays, change management and management style are necessary to make a "compact public service" and a retreating government possible. Simons control framework could play an important role to implement organizational strategies into fast moving environments. The controller that seeks actively to contribute to organizational changes and the balance between control and innovations will try to apply this framework. Changing people or to get in motion occurs

by motivating them to learn, to bring to learning situations and increase the learning capacity (Vaassen, 2003). When (project) employees have an open attitude towards changes, steps can be taken to create a results-oriented culture and organizations are more likely to obtain an optimal project control.

5.3. Further research

Based on the results of this research the following follow-up studies are suggested:

Further research has to be done on the success of the agency model that is been introduced in 1994, whereby independent executive departments provides services to the secretary of state for a fee. Usually an agency has a supportive or executive role to the department of state to which it belongs. In the agency model there has to be research on, why the agency model works in one public project organizations and not in others and what are decisive factors in this context.

In this research there have been some starting points, suggesting that infrastructure projects are more likely to manage better than other project organizations. Based on these starting points no general conclusions can be made. It also seems more likely that project control of infrastructure projects with DBFM-contracts are better obtained than other project organizations. It is recommendable to follow-up this multiple case study with a practical research on obtaining project control of ICT project in comparison with infrastructure projects. In this context, it is interesting to examine which one of them is better to control and what the decisive factors are. It is also advisable to follow research on the application of DBFM-contracts with (sub) contractors on ICT projects.

Previous research by the government about experiences with DBFM-contracts has shown that the application of these contracts leads to significant results in efficiency gains and improvements of project control. Therefore research has to be done on the application of DBFM-contracts to investigate whether they lead to a better obtaining of project control within public ICT projects, because it seems likely that risk management is in the principals opinion a task of the agent.

Finally, further research has to be done on the results over relationships between the scores of the intstruments, reviews on the statements of project control and the levels of maturity.

Epilogue

Budget cuts are often an incentive for public (project) organizations to work on an efficient and effective way. In addition, the additional requirements of the government have an important influence on obtaining project control. The results of the *masterclass about project control on 19 may 2011,* that has been organized, for the respondents, to provide the research results of the multiple case stud*y,* are presented bellow.

At the masterclass the respondents discussed among themselves how to interpret the role of the (project) controller, project portfolio management, risk management and the necessity of soft controls against the available hard controls. At one organization, this is at a more advanced stage than other project organizations. Soft controls and more specifically the belief systems becomes an important topic with the respondents.

The respondents perceive a project management methodology as a tool to obtain project control. Applications of a project management methodology which are not adapted to the organization do not always leads to the desired results. Therefore a project management methodology should have its management tools tailored to the respective organization and its culture. Therefore, the use of instruments is in itself not sufficient to obtain project control.

The human factor, employees and culture (attitudes and behavior) are seen by the most of the respondents as the foundation for obtaining project control. Attitude and behavior of employees are thereby essential to realize the desired results. At many organizations dialogues already take place, and employees confront each other on bad project results. In this context are the problems discussed, but remain consequences of actions usually omitted. Within many organizations promoting the exemplary behavior of the (executive/top) management is important. Empathy and skills of employees are also important to create a result-oriented culture.

Some respondents indicated that more attention need to be paid to the independent advisory role of the (project) controller. In addition, the respondents discussed about a broadening of the controller function, whereby the controller evolves from a supportive role to a strategic player who tries on the sidelines to exert influence and also is part of the management. Practical research has shown that, on paper, the (project) controller mostly is positioned as independent to the project manager. But the

position of the (project) controller is in practice most often not properly defined. So based on this research, the theory about the role of the (project) controller is not yet in line with practice.

The respondents experience the benefits of performing series of mini projects. Through the application of performing series of mini projects, the effects of interventions can be determined more quickly. Based on the business cases and relation to strategic organizational objectives as criteria, it should be clear whether the project adds value to the organizational objectives. In this context, the interdependencies, scheduling and resource allocation should be made transparent and communicated well within the organization. The respondents recognize the importance of this and want to apply this within their organization. When none of these criteria is met, the projects will be returned to the principal or secretary of state. In addition, each organization must be aware of the current legislation, for early response to the situation. During the round table session, respondents have indicated their wish to learn and benefit more from other organizations, with sharing and applying best lessons learned to future projects of the organizations. After the masterclass, respondents have exchanged business cards to follow up and exchange ideas on managing and controlling public projects in future. Finally, the respondents were curious about the research results and what they may indicate about further research.

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Appendix I: Control typology Hofstede
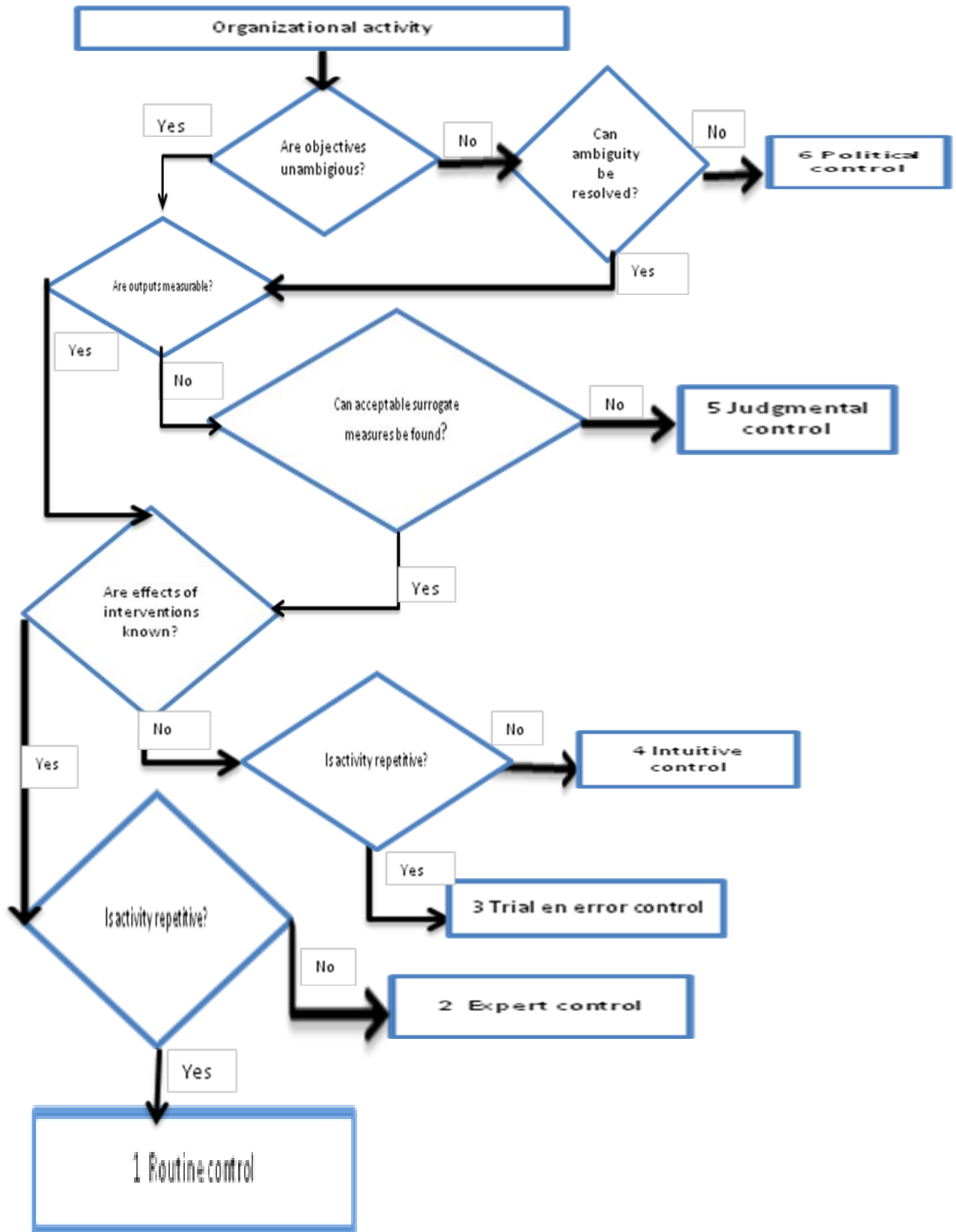
Explanation of control typology Hofstede:

1. **Routine control:**

In this case, rules and regulations can be implemented by operational employees or computer systems because of the repetitive nature of activities within the project organization. These activities which have a highly repetitive nature can be solved without much creativity.

2. **Expert control:**

This occurs when activities are not repetitive, but the objectives and measurement of effects of interventions in projects are not visible and it may be useful to entrust control to an expert with specialized knowledge on this field. Expertise and creativity determines the execution and solution of projects.

3. **Trial and error control**

This occurs when the activity becomes repetitive in nature. The objectives and effects of interventions in projects are not visible and the organization can learn form its own control, through their own mistakes and shortcomings of human behavior processes.

4. **Intuitive control**

This occurs when the activities are not repetitive in nature, and effects of interventions and outcomes of project results are not visible. When these criteria are met, usually a leader is enabled and appointed to intuitively appropriate forms of intervention which are necessary to achieve the desired results.

5. **Judgmental control**

This is applicable when there are no direct measures available and control becomes a matter of subjective judgment in projects. This depends greatly on the influence of power and the organizational structure.

6. **Political control**

This occurs with ambiguous goals, and high political ambitions. Hofstede distinguishes hereby three reasons including; interests, values, lack of knowledge and the presence of a turbulent environment.

Appendix II: Levers of Control

Appendix III: Self assessment public project organization

Introduction
Based on the results of the in-depth interviews the level of maturity of the project organizations will be determined. In addition, the levels of maturity will be compared with the other project organizations. The in-depth interviews are conducted by officers who perform the role of the (project) controller. Participation on this depth interview will take approximately 45 minutes.

Topics depth interview
General information **Project management control system** **Statements project control** **Project governance** **Project portfolio management** **Business case management** **Risk management** **Entrepeneurship** **Culture and reports**

( ): multiple choice answer 1-5
1 Totally disagree 2 Disagree 3 Neutral (no opinion) 4 Agree 5 Strongly agree

General information		
Organization:	X	
Classification organizational branch:	Cash services	
Number of employees (FTE) within the organization.	(>500)	
Position of the respondent within organization:	concern controller	
Holding on position:	1-2 year	
How long does the project organization exist?	5-10 year	
Which project management methodology is used within the (project)organization?	Prince2	
Visible improvements since introduction of project management methodology in project organization.	Yes	
Typology of projects within the (project) organization.	ICT projects	

General information		
Number of project managers/project leaders within your project organization?	(>15)	
Average length of your projects?	3-4 year	
Average costs of your projects?	> € 1.000.000	
How many projects do you manage?	(>15)	
Main projects are performed for?	Government	
Who is the largest principal in your organization?	Government	

Statements project control	1	2	3	4	5	
1. Projects more expensive than budgeted.	5 Strongly agree					
2. Projects longer than planned.	5 Strongly agree					
3. Projects deliver desirable results.	2 Disagree					
4. Projects deliver visible results.	2 Disagree					
5. Satisfaction of principals.	4 Agree					
6. Projects are often prematurely terminated.	2 Disagree					
7. Influence of stakeholders.	4 Agree					
8. Support by principals.	5 Strongly agree					
9. Obtaining project control as an important management topic.	4 Agree					

Project management control system
The following instruments will be scored with a value between 1 and 10, where 1 means that the process is not calibrated into the project organizations and 10 means that the process is perfectly calibrated and the project components are operating perfectly within the project organization.

Project components:	1	2	3	4	5	6	7	8	9	10
Project governance	5									
Project portfolio management	3									
Business cases management	2									
Risk management	5									
Culture (result-oriented)	4									

Open questions
Which factors are decisive to obtain project success and project control and what kind of role should the (project) controller have within obtaining these factors?
Answer public project organization:
A business approach, a good foundation, and also discipline are necessary conditions to complete project methodologies in order to increase the obtaining of project success and project control.

Appendix IV: Topic list depth interviews[9]

Project governance	Deployment instrument and impact culture according to control typology of Hofstede
Agreements are transparent, documented and communicated well to all stakeholders.	1 = boundary, 2 = diagnostic, 3 = inter-active, 4 = belief, 5 control typology Hofstede
There is clarity about how, when and to whom they should be reported.	
Periodic customer satisfaction surveys are evaluated and actions are taken.	
Open questions	
Does every project have a start and end date?	
Which officer determines the start of projects?	
What is the method of making decisions on the project organization?	
Does the principal have sufficiently clarity about he wants to achieve?	
How is the transfer and communication between the various stakeholders organized?	
Is there clarity about the principal, contractors, their responsibilities and power?	

Project portfolio management	Deployment instrument and impact culture according to control typology of Hofstede
Every project has a one-time renewal, improvement or change to achieve the strategic organizational objectives for the principal and contractor.	1 = boundary, 2 = diagnostic, 3 = inter-active, 4 = belief, 5 control typology Hofstede
The scope, objectives, requirements and expectations to achieve the re-sults are available and known for each project team.	
Interdependencies of the project are clear and communicated well.	
Go/No-Go decisions are taken for each individual project.	
The added value of projects to the strategic organizational objectives are monitored periodically and actions are taken on the strategically value of projects.	
Open questions	
Who has the final responsibility for project portfolio management and what is the role of the controller in this context?	

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[9] Topic list has been used as a tool during the in-depth interviews with representatives of departments and executive organizations.

Business case management	Deployment instrument and impact culture according to control typology of Hofstede
For each project a business case will be drawn.	1 = boundary, 2 = diagnostic, 3 = interactive, 4 = belief, 5 control typology Hofstede
Without a business case a project cannot start and no decisions will be taken.	
From the start of the project the principal will check the accuracy and completeness of a business case.	
The scope of the project and business case is actively monitored.	
The impact of a change in the scope are made clear, documented, being reviewed and actions are taken.	
Go-No-Go moments are defined in projects.	
The milestones and achievables of every project are planned and communicated to stakeholders and project employees.	
Open questions	
Who is responsible for the presence and obtaining of business cases?	

Risk management	Deployment instrument and impact culture according to control typology of Hofstede
For each project the inventarisation of risks are made visible and communicated well to the project board.	1 = boundary, 2 = diagnostic, 3 = interactive, 4 = belief, 5 control typology Hofstede
For every impact of risks probability, control measures are taken.	
Management has insight and knowledge to monitor and manage risks.	
Additional work procedures are contracted and adequately monitored.	
Open questions	
Is there sufficient knowledge present and available on the field of risk management? What is the role of the controller in this context?	

Entrepeneurship / culture	Deployment instrument and impact culture according to control typology of Hofstede
It is common to confront each other on bad project results.	**1 = boundary, 2 = diagnostic, 3 = inter-active, 4 = belief, 5 control typology Hofstede**
Within the organization agreements are kept.	
Each project team is responsible for a part of the overall result.	
Every employee should be responsible for a part of the overall result.	
Judgements on results and budget responsibility leads to creativity and entrepreneurship.	
Judgements must be based on the delivered performance of project employees.	
Employees are committed, energetic, initiative, motivated and proud to work for the organization.	
Employees can make mistakes and have the opportunity to work on their personal development.	
Within the organization a kind of internal/ social control is present, so abnormal behavior can be limited to a certain level.	
To obtain project control, you need energetic, committed and creative project employees.	
Periodically an employee's satisfaction is conducted, evaluated and actions are taken.	
Open questions	
Could you describe the organization culture within your company?	
Are there criteria for project employees who have delivered bad (project) results?	
Do project employees recognize themselves with their job profiles?	
Does the management provide a good example to project employees?	

Organization and reports	Deployment instrument and impact culture according to control typology of Hofstede
Periodically the financial status of each project is made visible, whereby the actual and latest estimates are put against each other to make a business analyze possible. A standard template for each project is also used with the same reporting procedures.	**1 = boundary, 2 = diagnostic, 3 = inter-active, 4 = belief, 5 control typology Hofstede**
Management reports are used to check the status of projects.	

Organization and reports	Deployment instrument and impact culture according to control typology of Hofstede
The full and actual status of the management aspects (money, time, quality, risk and issues) of each project is accessible for every authorized project employee with a transparent report.	1 = boundary, 2 = diagnostic, 3 = interactive, 4 = belief, 5 control typology Hofstede
The completed reports are discussed and approved by senior management.	
Based on reports decisions and sanctions are made.	
After the completion of each project, the project will be evaluated with the project team and principal.	
Best lessons learned of every project are shared within the organization and its stakeholders.	
Periodically the organization is working on activities for leadership, competencies and development of skills.	
For each project the required skills and competencies are clear.	
For every project a project team will be matched.	
A project manual is available and cleary communicated within the organization.	

(Project) controller	Deployment instrument and impact culture according to control typology of Hofstede
Main duties of the (project) controller are clear and communicated well within the organization.	1 = boundary, 2 = diagnostic, 3 = interactive, 4 = belief, 5 control typology Hofstede
Which reports have to be prepared by the (project) controller?	
What is the influence of a (project) controller on a project management control system?	
Open questions	
What is the relationship between the (project) controller and project manager with a management control system in a project based environment? What are the differences between them and can anything be said about the maturity of project organizations?	
What are the ambitions of the project organization on the field of obtaining project control?	

Appendix V: Self assessments public ICT projects

Statements project control

Self assessment statements project control with ICT projects	Projects more expensive than budgeted (money)	Projects longer than planned (time)	Projects delivers desirable results (quality)	Projects delivers visible results (quality)	Satisfaction of principals (quality)	Premature termination of projects (information)	Influence of stakeholders (organization)	Support by principals (organization)	Obtaining project control is an important management topic (organization)
Organization 1	4	4	3	4	4	2	4	2	5
Organization 2	3	3	2	4	4	2	4	3	3
Organization 3	3	4	4	4	3	2	5	3	4
Organization 4	3	4	2	2	2	4	2	2	2
Organization 5	2	4	3	3	3	2	3	3	3
Organization 6	3	3	4	3	3	4	3	3	2
Organization 7	5	4	2	2	4	2	4	3	4
Organization 8	4	4	4	3	3	2	3	2	4
Organization 9	3	4	4	4	4	2	4	3	2
Total filled	9	9	9	9	9	9	9	9	9
Averaged total	**3,3**	**3,5**	**3,8**	**3,6**	**3,6**	**2,1**	**3,4**	**3,3**	**3,6**
Averaged ict	**3,3**	**3,8**	**3,1**	**3,2**	**3,3**	**2,4**	**3,6**	**2,7**	**3,2**

Self assessments instrumental control mechanisms

Public organizations with ICT projects	Project governance	Project portfolio management	Business case management	Risk management	Culture
Organization 1	6	7	7	7	7
Organization 2	6	6	7	6	6
Organization 3	8	7	5	6	4
Organization 4	5	7	4	4	5
Organization 5	6	6	6	8	5
Organization 6	7	7	6	6	5
Organization 7	6	3	2	5	4
Organization 8	7	3	4	5	6
Organization 9	5	2	3	2	2
Total filled	9	9	9	9	9
Averaged total	**6,5**	**5,7**	**5,6**	**6,3**	**5,9**
Averaged ICT	**6,2**	**5,3**	**4,9**	**5,4**	**4,9**

Appendix VI: Selfassesments public infrastructure projects

Statements project control

Self assessment statements project control with infrastructure projects	Projects more expensive than budgeted (money)	Projects longer than planned (time)	Projects delivers desirable results (quality)	Projects delivers visible results (quality)	Satisfaction of principals (quality)	Premature termination of projects (information)	Influence of stakeholders (organization)	Support by principals (organization)	Obtaining project control is an important management topic (organization)
Organization 1	2	4	5	5	5	1	4	4	5
Organization 2	5	5	4	4	4	2	4	4	4
Organization 3	3	3	4	3	3	3	2	3	2
Organization 4	3	2	5	4	4	1	4	4	5
Organization 5	4	4	4	3	3	2	2	4	4
Organization 6	2	2	4	4	4	2	4	4	4
Organization 7	4	2	4	4	4	2	4	3	4
Organization 8	2	2	5	5	4	2	5	5	3
Organization 9	2	2	5	4	4	1	3	4	5
Organization 10	4	4	5	4	4	1	4	4	4
Total filled	10	10	10	10	10	10	10	10	10
Averaged total	**3,3**	**3,5**	**3,8**	**3,6**	**3,6**	**2,1**	**3,4**	**3,3**	**3,6**
Averaged infrastructure	**3,1**	**3,0**	**4,5**	**4,0**	**3,9**	**1,7**	**3,6**	**3,9**	**4,0**

Selfassesments instrumental controls mechanisms

Public organizations with infrastructure projects	Project governance	Project portfolio management	Business case management	Risk management	Culture
Organization 1	8	5	5	7	10
Organization 2	1	5	7	7	3
Organization 3	7	6	5	6	5
Organization 4	8	8	8	8	8
Organization 5	6	6	5	6	5
Organization 6	7	5	8	8	8
Organization 7	9	4	7	8	7
Organization 8	7	4	3	8	8
Organization 9	8	8	9	8	7
Organization 10	8	5	3	7	5
Total filled	10	10	10	10	10
Averaged total	**6,5**	**5,7**	**5,6**	**6,3**	**5,9**
Averaged infrastructure	**6,9**	**5,6**	**6,0**	**7,3**	**6,6**

Appendix VII: Self assessments public other projects

Statements project control

Selfassesment statements project control with other projects	Projects more expensive than budgeted (money)	Projects longer than planned (time)	Projects delivers desirable results (quality)	Projects delivers visible results (quality)	Satisfaction of principals (quality)	Premature termination of projects (information)	Influence of stakeholders (organization)	Support by principals (organization)	Obtaining project control is an important man-agement topic (organization)
Organization 1	4	4	4	4	4	2	4	4	4
Organization 2	4	4	2	4	3	4	2	2	2
Organization 3	2	4	4	3	4	1	2	4	3
Organization 4[10]									
Organization 5	4	4	4	3	3	2	3	3	4
Organization 6	4	4	3	3	3	2	2	2	4
Total filled	5	5	5	5	5	5	5	5	5
Averaged total	**3,3**	**3,5**	**3,8**	**3,6**	**3,6**	**2,1**	**3,4**	**3,3**	**3,6**
Averaged other	**3,6**	**4**	**3,4**	**3,4**	**3,4**	**2,2**	**2,6**	**3**	**3,4**

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[10] Because of the anonymity of the fourth organization, the results are not included in the calculation of the averaged score of the other projects.

Self assessments instrumental control mechanisms

Public organizations with other projects	Project governance	Project portfolio management	Business case management	Risk management	Culture
Organization 1	8	8	8	8	9
Organization 2	2	4	3	4	2
Organization 3	7	8	7	6	8
Organization 4	6	8	6	7	8
Organization 5	7	7	5	6	6
Organization 6	7	3	6	5	5
Total filed	6	6	6	6	6
Averaged total	**6,5**	**5,7**	**5,6**	**6,3**	**5,9**
Averaged other	**6,2**	**6,3**	**5,8**	**6,0**	**6,3**

Appendix VIII: Maturity levels public project organizations

Maturity levels public ICT projects

Public organizations with ICT projects	Maturity level
Organization 1	3
Organization 2	2
Organization 3	3
Organization 4	3
Organization 5	2
Organization 6	3
Organization 7	2
Organization 8	3
Organization 9	1
Averaged total	**2,6**
Averaged ICT	**2,4**

Maturity levels public infrastructure projects

Public organizations with infrastructure projects	Maturity level
Organization 1	3
Organization 2	1
Organization 3	2
Organization 4	4
Organization 5	2
Organization 6	3
Organization 7	4
Organization 8	2
Organization 9	4
Organization 10	2
Averaged total	**2,6**
Averaged infrastructure	**2,7**

Maturity levels public other projects

Public organizations with other projects	Maturity level
Organization 1	3
Organization 2	1
Organization 3	3
Organization 4	3
Organization 5	3
Organization 6	2
Averaged total	**2,6**
Averaged other	**2,5**

Appendix IX: Analysis of research results

Analysis of the relationship between instruments, statements project control and levels of maturity

Model Summary				
Model	R	**R Square**	Adjusted R Square	Std. Error of the Estimate
	,955[a]	**,913**	,777	,417

A. Predictors: (Constant), all instruments and nine statements of project control *(see appendix III)*.
B. Dependent Variable: maturity level.

The analysis of the R square shows a strong linear relationship between the level of maturity and the scores of the instrumental control mechanisms project governance, project portfolio management, business case management, risk management, culture and the reviews on the nine statements of project control *(self assessment appendixes V till VIII)*. A positive score of instruments and reviews of the statements on project control seems more likely to result to a higher level of maturity.

ANOVA[b]					
Model	Sum of Squares	df	Mean Square	F	**Sig.**
Regression	16,390	14	1,171	6,719	**,003[a]**

A. Predictors: all instruments and nine statements of project control *(see appendix III)*.
B. Dependent Variable: maturity level.

The analysis of the ANOVA shows that the significance of 3,00% is smaller than the alpha of 5% as starting point, so a significant relationship can be identified between the level of maturity and the scores of instruments and reviews of the statements on project control.

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients		
Model	**B**	Std. Error	Beta	t	**Sig.**
(Constant)	1,432	2,041		,702	,501
Project governance	,067	,102	,139	,655	,529
Project portfolio management	**,163**	,080	,336	2,054	**,070**
Business case management	,035	,082	,076	,427	,680
Risk management	-,091	,115	-,162	-,789	,451
Culture	**,145**	,094	,342	1,546	**,157**
Projects more expensive than budgeted	-,043	,153	-,046	-,280	,786
Projects longer than planned	**-,351**	,165	-,352	-2,133	**,062**
Projects delivers visible results	,307	,176	,343	1,742	,116
Projects delivers desirable results	**-,403**	,217	-,354	-1,856	**,096**

Coefficients[a]					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
(Constant)	1,432	2,041		,702	,501
Satisfaction of principals	,076	,308	,056	,247	,811
Influence of stakeholders	,169	,147	,185	1,148	,281
Support by principals	-,426	,245	-,408	-1,737	,116
Obtaining project control as an important management topic	,312	,205	,360	1,526	,161

A. Dependent Variable: maturity level.

Nature of the relationship between instruments, statements project control and levels of maturity:

- **Project portfolio management:**

  The beta coefficient of 0,163 suggest, that this is in line with the assumptions about the level of maturity, because it was expected that a higher score on project portfolio management would lead to a higher level of maturity. In addition, there is a positive significance relation between the level of maturity and the score of project portfolio management, because the significance of 7,00% fits in the significance level of 10%. So when projects are performing well according to the objectives of project portfolio management a higher level of maturity seems to be more likely.

- **Projects longer than planned**

  Based on the beta coefficient of -0,351, it can be concluded that despite their negative nature, the results are in line with the assumption about the level of maturity. With a lower score on this statement a lower level of maturity was expected. This result is in line with the previous assumption. In addition, a negative significance relation can be identified between the level of maturity and the scores of this statement, because the significance of 6,20% fits in the significance level of 10%. So when projects take longer than planned a lower level of maturity seems to be more likely.

- **Projects delivers desirable results**

  Based on the beta coefficient of -0,403, it can be stated that, because of their negative nature, the results of the levels of maturity are not in line with the assumptions. It was expected that the score on this statement would lead to a higher level of maturity. In addition, based on the results of the significance of 9,60% which fits in the significance level of 10% a negative significant relation can be identified between the level of maturity and the

scores of projects which deliver desirable results. When projects deliver the desirable results, a lower level of maturity seems to be more likely.

- **Culture:**

  The beta coefficient of 0,145 suggest, that this is in line with the assumption, because it was expected that at a higher score of culture would lead to a higher level of maturity. In addition, no significance relation can be identified between the level of maturity and the score of culture, because the significance of 15,70% does not fit within the significance level of 10%. Therefore no significance relationship can be identified between the scores of culture and the level of maturity.

Analysis of instruments and statements
(I) The relationship between project governance and statements

Model Summary				
Model	R	**R Square**	Adjusted R Square	Std. Error of the Estimate
1	,791[a]	**,626**	,386	1,443

    A. Predictors: (Constant), all nine statements of project control *(see appendix III).*
    B. Dependent Variable: project governance.

The analysis of the R square shows a strong linear relation between the scores of project governance and the reviews on the statements of project control. Positive reviews on the statements of project control seem more likely to result in higher scores for project governance.

ANOVA[b]					
Model	Sum of Squares	df	Mean Square	F	**Sig.**
Regression	48,854	9	5,428	2,607	**,053[a]**

    A. Predictors: (Constant) all nine statements of project control *(see appendix III).*
    B. Dependent Variable: project governance.

The analysis of the ANOVA model shows that the significance of 5,30% fit within the significance level of 10%. So a significance relation can be identified between the score of project portfolio management and the reviews of the statements on project control.

Coefficients[a]					
	Unstandardized Coefficients		Standardized Coefficients		
Model	**B**	Std. Error	Beta	t	**Sig.**
(Constant)	12,780	5,178		2,468	,027
Projects more expensive than budgeted	-,457	,438	-,237	-1,043	,315
Projects longer than planned	**-,824**	,431	-,396	-1,910	**,077**
Projects delivers visible results	**,965**	,519	,518	1,859	**,084**
Projects delivers desirable results	**-1,109**	,676	-,467	-1,640	**,123**
Satisfaction of principals	,009	,911	,003	,009	,993
Premature termination of projects	-,584	,755	-,279	-,773	,452
Influence of stakeholders	,488	,436	,257	1,119	,282
Support by principals	-,874	,594	-,402	-1,473	,163
Obtaining project control as an important management topic	,235	,515	,130	,457	,655

    A. Dependent Variable: project governance.

Nature of the relationship between project governance and statements:

- **Projects longer than planned**

  The beta coefficient of -0,824 suggest, that the scores of project governance are in line with the assumptions, because it was expected that a lower score for this statement would lead to a lower score on project governance. In addition, because the significance of 7,70% fits in the significance level of 10%, a negative significance relation can be identified between project governance and the scores of this statement. So when projects take longer than planned, a lower score of project governance seems more likely.

- **Projects delivers visible results**

  The beta coefficient of 0,965 suggest, that this is in line with the assumptions, because it was expected that a higher score on this statement would lead to a higher score for project governance. In addition, based on the beta coefficient and the significance of 8,84% that fits within the significance level of 10%, a positive significance relation can be identified between project governance and the scores of this statement. So a higher score of projects that deliver visible results seems more likely to result in a higher score of project governance.

- **Projects delivers desirable results**

  The beta coefficient of -1,109 suggest, that this is not in line with the assumption, because it was expected that a higher score of this statement would lead to a higher score of project governance. In addition, no significance relation can be identified between project governance and the scores on this statement, because the significance of 12,30% doesn't fit within the significance level of 10%. Therefore no negative significance relation can be identified between the scores of projects that deliver desirable results and the scores of project governance.

(II) The relationship between project portfolio management and statements

Model Summary				
Model	R	**R Square**	Adjusted R Square	Std. Error of the Estimate
1	,599[a]	**,359**	-,054	1,864

    A. Predictors: (Constant), all nine statements of project control *(see appendix III).*

The analysis of the R square shows a small linear relationship between the scores of project portfolio management and the reviews on the statements of project control. Positive reviews of the statements on project control seem more likely to lead to a higher score on project portfolio management.

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27,189	9	3,021	,869	,572[a]

 A. Predictors: (Constant), all nine statements of project control *(see appendix III).*
    Dependent Variable: project portfolio management.

The analysis of the ANOVA model shows that the significance does not fit within the significance level of 10%. So no significance relation can be made between the scores of project portfolio management and the reviews on the statements of project control.

Coefficients[a]					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
(Constant)	2,842	6,689		,425	,677
Projects more expensive than budgeted	-,885	,566	-,465	-1,562	,141
Projects longer than planned	,255	,557	,124	,457	,655
Projects delivers visible results	-,155	,671	-,085	-,232	,820
Projects delivers desirable results	-,322	,873	-,138	-,369	,718
Satisfaction of principals	-,734	1,177	-,264	-,624	,543
Premature termination of projects	,916	,975	,444	,939	,364
Influence of stakeholders	-,223	,563	-,119	-,396	,698
Support by principals	1,065	,767	,497	1,390	,186
Obtaining project control as an important management topic	**1,259**	,665	,706	1,894	**,079**

    A. Dependent Variable: project portfolio management.

Nature of the relationship between project portfolio management and statements

- **Obtaining project control as an important management topic**

  The beta coefficient of 1,259 suggest, that this is in line with the assumptions, because it was expected that a higher score of this statement would lead to a higher score on project portfolio management. In addition, positive significance relations can be identified between project portfolio management and the scores of this statement, because the significance of 7,90% fits in the significance level of 10%. Therefore, a higher score on obtaining project control as an important management topic would more likely lead to a higher score on project portfolio management.

III The relationship between business case management and statements

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,633[a]	,401	,015	1,918

A. Predictors: (Constant), all nine statements of project control *(see appendix III)*.

The analysis of the R square shows a moderate linear relationship between the scores of business case management and the reviews of the statements on project control. Therefore, positive reviews on the statements of project control are more likely to lead to a higher score for business case management.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34,430	9	3,826	1,039	,457[a]

A. Predictors: (Constant), all nine statements of project control *(see appendix III)*.
B. Dependent Variable: business case management.

The analysis of the ANOVA model shows that the significance of 45,70% doesn't fit within the significance level of 10%. Therefore, no significance relation can be identified between the scores of business case management and the reviews on the statements of project control.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	4,319	6,884		,627	,541
Projects more expensive than budgeted	-,447	,583	-,221	-,766	,456
Projects longer than planned	-,552	,574	-,253	-,963	,352
Projects delivers visible results	-,345	,690	-,176	-,499	,625
Projects delivers desirable results	,274	,899	,110	,305	,765
Satisfaction of principals	,224	1,211	,076	,185	,856
Premature termination of projects	,404	1,004	,184	,402	,694
Influence of stakeholders	-,665	,580	-,334	-1,147	,270
Support by principals	,332	,789	,146	,421	,680
Obtaining project control as an important management topic	1,244	,684	,655	1,818	,091

A. Dependent Variable: business case management.

Nature of the relationship between business case management and statements

- **Obtaining project control as an important management topic**

  The beta coefficient of 1,244 suggest, that this is in line with the assumptions. It was expected that a higher score on this statement would lead to a higher score on business case management. In addition, based on the results of the significance of 9,10% a positive significance relations can be identified between business case management and the score on this statement, because the significance fits between the significance level of 10%. Therefore, a higher score on obtaining project control as an important management topic seems more likely to lead to a higher score on business case management.

(IV) The relationship between risk management and statements

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,819[a]	,671	,460	1,157

    A.   Predictors: (Constant), all nine statements of project control *(see appendix III)*.

The analysis of the R square shows a strong linear relationship between the score of risk management and the reviews on the statements of project control. Therefore, positive reviews on the statements of project control seems more likely to lead to a higher score for risk management.

ANOVA[b]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	38,229	9	4,248	3,175	,026[a]

A.   Predictors: (Constant), all nine statements of project control *(see appendix III).*
B.   Dependent Variable: risk management.

The analysis of the ANOVA model shows that the significance of 2,60% is smaller than the alpha of 5% as starting point. Therefore, no significant relation can be identified between the score of risk management and the reviews of the statements on project control.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1,696	4,150		,409	,689
Projects more expensive than budgeted	-,202	,351	-,123	-,576	,574
Projects longer than planned	-,435	,346	-,244	-1,257	,229
Projects delivers visible results	-,231	,416	-,145	-,554	,588
Projects delivers desirable results	,181	,542	,089	,333	,744
Satisfaction of principals	-,419	,730	-,174	-,574	,575
Premature termination of projects	,484	,605	,271	,800	,437
Influence of stakeholders	,026	,349	,016	,073	,943
Support by principals	1,061	,476	,571	2,229	,043
Obtaining project control as an important management topic	1,106	,413	,715	2,679	,018

A.   Dependent Variable: risk management.

Nature of the relationship between risk management and statements:

- **Support by principal**

  The beta coefficients of 1,061 suggest, that this is in line with the assumption. It was expected that a higher score of this statement would lead to a higher score of risk management. Despite the beta coefficient, no significance relation between risk management and the score of this statement can be identified, because the significance score of 4,43% is smaller than the alpha of 5% as starting point.

- **Obtaining project control as an important management topic**

  The beta coefficient of 1,106 suggest, that this is in line with the assumption. It was expected that a higher score on this statement would lead to a higher score on risk management. Despite this beta coefficient, no significance relation between risk management and the score of this statement can be identified, because the significance of 1,18% is smaller than the the the alpha of 5% as starting point.

(V) The relationship between culture and statements

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,802[a]	,644	,415	1,590

    A.   Predictors: (Constant), all nine statements of project control *(see appendix III)*.

The analysis of the R square shows a strong linear relationship can be identified between culture and the reviews on the statements of project control. Therefore, positive reviews of the statements on project control seem more likely to lead to a higher score for culture.

ANOVA[b]					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	63,934	9	7,104	2,809	,041[a]

A.   Predictors: (Constant), all nine statements.
B.   Dependent Variable: culture.

The analysis of the ANOVA model shows that the significance of 4,10% is smaller than the alpha of 5% as starting point. Therefore, no significant relation can be identified between the score of culture and the reviews on the statements of project control.

Coefficients[a]	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
(Constant)	-,282	5,706		-,049	,961
Projects more expensive than budgeted	**-1,068**	,483	-,491	-2,211	**,044**
Projects longer than planned	-,262	,475	-,112	-,551	,590
Projects delivers visible results	,162	,572	,077	,284	,781
Projects delivers desirable results	-,504	,745	-,188	-,676	,510
Satisfaction of principals	1,277	1,004	,402	1,272	,224
Premature termination of projects	,930	,832	,394	1,118	,283
Influence of stakeholders	-,283	,480	-,132	-,590	,565
Support by principals	,326	,654	,133	,499	,626
Obtaining project control as an important management topic	**1,431**	,567	,701	2,523	**,024**

    A.   Dependent Variable: culture

Nature of the relationship between culture and statements:

- **Projects more expensive than budgeted**

  The beta coefficient of -1,068 suggest, that this result is in line with the assumption. It was expected that a higher score of this statement would lead to a lower score of culture. In addition, because of the significance of 4,44%, which is smaller than the alpha of 5% as starting point, so no significance relation between culture and the scores on this statement can be identified.

- **Obtaining project control as an important management topic**

  The beta coefficient of 1,431 suggest, that this result is in line with the assumption. It was expected that a higher score on this statement would lead to a higher score on culture. Despite this beta coefficient, no significance relation can be identified between culture and the results of this statement, because the significance of 2,24% is smaller than the alpha of 5% as starting point.

Analysis of maturity level and control typology Hofstede

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.417[a]	.174	.009	.866

A. Predictors: (Constant), political control, expert control, judgment control, intuitive control.

The analysis of the R square shows a very small linear relation between the maturity level and the control typology of Hofstede. This relationship is practically negligible.

ANOVA[b]					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3.160	4	.790	1.053	.405[a]

A. Predictors: (Constant), political control, expert control, judgment control, intuitive control.
B. Dependent Variable: maturity level.

The analysis of the ANOVA model shows that the significance of 40,50% doesn't fit within the significance level of 10%. Therefore no significant relationship between the level of maturity and the control typology of Hofstede can be identified.

Coefficients[a]					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
(Constant)	3.000	.354		8.485	.000
Expert control	-1.000	.935	-.230	-1.069	.298
Intuitive control	-.250	.559	-.108	-.447	.660
Judgement control	7.630E-16	.707	.000	.000	1.000
Political control	-.750	.433	-.440	-1.732	.099

a. Dependent Variable: maturity level.

- **Political control**
  The beta coefficient of -0,750 suggest, that this result is in line with the assumption. It was expected that a higher score of this control typology proposed by Hofstede, would lead to a lower level of maturity. In addition, because of the significance of 9,90%, which fits in the significance level of 10%, a significance relation between politival control and the level of maturity can be identified.

Appendix X: Report on in-depth interview public project organization

Introduction organization

Within the project organization, a number of projects are focused on the process of changes or improvements of the automated support. ICT have an important role in this information chain.

Introduction respondent

The concern controller is currently responsible for a number of large ICT projects. Furthermore for supporting and challenging management and project controllers.

The concern controller has in the past contributed to the initiation, development and the operation of a management control system in a project based environment. Here recommendations from the research of the Court of Audit (Algemene Rekenkamer) have been taken into account.

Project governance

Generally projects are driven by changing laws and regulations. Because of the different interests, it is difficult to establish the priorities for projects. This causes the development of certain dynamics and most of the time leads to frictions within the organization. In order to solve the problem about the priorities of the project, a project portfolio management has been established.

The mandate[11] starts at the Project Initiation Document (PID). [12] After the authorization of the project brief by the principal, the resources are provided by the secretary of state to the Chief Financial Officer (CFO), who is a member of the management board of this organization. After the resources are provided, the principal of the business unit will determine a project board from the project portfolio management board, which is responsible to report to the principal, the government. The project portfolio management board takes the decision to start initiating the project with the project brief. Because the business units have an autonomous nature and other methods are used within the director general (DG) [13] than is common within the organization, conflicts are created.

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[11] A mandate is the authority to act in the name of another, but without taking his responsibility. With the mandate no responsibilities are transferred. The givers of the mandate remain self empowered.
[12] A Project Initiation Document could be described as an approach of a plan of approach. This has similarity with the business case which has been mentioned in the literature review of this research.
[13] A director general is responsible for controlling the implementation of legislation.

In line with Prince2 the supplier, i.e., the principal, is together with the project board responsible for the completion of successful projects.

The department of internal affairs created new legislation to report and monitor the execution of large projects within the Dutch government. Every month, the five largest projects (greater than €5 million with a high risk profile or €20 million) are reported to the portfolio management board. During the meetings with the top management and control units, signals and findings (solicited and unsolicited) of the project controllers are presented to the management board. Often these signals and finding lead to adjusting the planning and control cycle.

Project portfolio management

The objectives of the project portfolio management are often not clear within the organization. For example not every portfolio team has a relationship with the strategic organizational objectives. However the main objectives of projects are established according to the strategic organizational objectives at the project portfolio management board. In addition, a lot of initiatives of efficiency considerations are established. Despite this improvement a step has to be taken to minimize friction in the organization. This could be achieved by reducing unclear and unambiguous objectives of project portfolio management.

As it was mentioned before, a design for the portfolio teams was setup. The concern controller has an advisory role to the project portfolio management board. The information managers and portfolio managers provide information to the board. At the project portfolio management board initiatives were discussed, the surival of the fittest applies here. Therefore, initiatives are not always innovative according to the strategic organizational objectives.

Previously the organization was an organization with directors, in which a lot of topics and points of attention were handled. Despite the fact this interaction was taking place, making a decision was a very difficult process. An external consultancy organization advised the appointment of a Chief Information Officer (CIO). The CIO received the functional management of providing information within the organization. But this functional line is insufficient to make changes into reality within the organization. Within different public organizations the cultural aspect is difficult to enforce. This makes it currently difficult to implement changes within the organization.

The strategy, vision and objectives of the organization are currently not supported by ICT processes. Initiatives are elaborated and discussed in the portfolio board. All projects are divided among

business units. In this context, the prioritization of projects is indicated. Currently there is too little research into whether projects fit within the organizational architecture and whether projects are congruent with each other.

Business cases

When projects are started, very often there is no comprehensive, clear and substantiated business case available. Even when a business case of a project exists; these are sporadically reassessed by the principal. In addition, the justifications of the business case are often inadequate and not included with proper estimates of benefits, revenues and costs of projects. In the preparation of business cases for a project usually the principal makes use of window dressing, in order to launch and get the project funded.

After several discussions about responsibilities within the organization, the process of the business cases has been rewritten. In the new situation the objectives, project plan, justifications of expenses and benefits of projects are included in the business cases. Some experts in the project board examined the content of the business case on the topics: costs, benefits, financial paragraph, reality versus planning and they made an inventarisation of risks. Once the business case is prepared, the project portfolio board provides a positive or negative recommendation to launch the project. Because the current CIO does not have sufficient mandate, the advice of the project portfolio board does not lead to a decision making process.

Usually projects are not prematurely terminated because projects can be restarted with supplementary budgets by the secretary of state. Because of budget cuts less supplementary funding is available at the secretary of state.

The customers of the organizations are generally satisfied with the results and the operation of the final products. The quality of the final products are good and reasonable, according to customer reviews of the organization. However, often more money is spend than budgetted. One of the reasons projects become more expensive than budgeted is the involvement of many stakeholders who have significant influences on the process. The involvements of the stakeholders often lead to changes in the scope of the final product for which the principal and management board are being held responsible. Due to changes of the scope, projects become more expensive than budgeted, because the organization focuses mostly on providing the desired quality. So within the organization, it can be concluded that the process of scope management is currently not well defined in light of

projects that become more expensive than was budgeted, because more attention is paid to the quality than the management aspects of time and money.

Risks

A risk paragraph is included in the business case, which should be aligned with the organizational environment and with an inventarisation of the derivative risks. In practice, risk management is only one of the ten chapters in the business case, and does not have a specific objective to adjust the plan and control cycle based on the results of the inventarisation of risks. There is also a paragraph about risks in the contract, but only because it is required.

Methodology

In 2009, Prince 2 is introduced. Unfortunately Prince 2 is not consistently pursued by project employees. Improvements due to the introduction of Prince 2 are therefore partially visible within the project organization. All project managers and controllers have followed the necessary Prince2 courses, but the current organizational culture restrains the improvements of project results.

Reports

Any financial information about the progress of projects is derived from the Enterprise Resource System (ERP). Because of this the progress of projects could easily be visible with management reports of the system. It should be noted that the accuracy of project results is improved according to the past plans. Despite this improvement in the organization, the relation between reporting and adjusting the planning and control cycles based on the project results is currently missing.

Projects larger then € 5 million or projects with a high risk profile above € 20 million are consequently expanded and reported to the secretary of state. This process is mainly driven on the management aspects of time, money and organization. In addition, twice a month a trend analysis is prepared. In this trend analysis, projects with a high risk profile are continuously assessed by the management on the elements: progress, controls, actions and findings of project controllers.

For all large projects, a standard project report is prepared in which all ten chapters of the business case are pursued, risks are made clear and the appropriate management measures are defined. In this context, has the principal to approve the reports according to a traffic light methodology. Consequently, controllers often have a different view on the project than the principal. Attentions to details of the preconditions which are defined in the business case are therefore necessary for the concern controller to be sure that all projects are in control.

People and culture

In order to obtain project control regularly external experts are hired for their specific knowledge to determine the effects of interventions. The organization culture as described previously is very dynamic to implement changes and let them operate. In addition, within the organization many frameworks, methods and tools are devised and calibrated. According to the concern controller, a project remains "people work" so project employees are very important to achieve project success. A project management methodology like Prince 2 should be seen as a necessary tool. But to achieve project success you need committed and motivated project employees.

Due to the accumulation of financial setbacks at large projects the organization has received negative publicity. In addition, the organization has difficulty refusing political influence. Nor does it provide a result-oriented culture, where project employees address each other on bad results and not living up to agreements. In addition, discipline is not highly valued so many agreements are not met. Mistakes can be made, only no one is held accountable and sanctions remain omitted. A project manager can be removed from his job for example. But this will not create a result-oriented culture within the organization. In addition, project employees often have other divergent interests. Project employees very often want to move up within the organization and make career moves.

Early last year, the organization has launched a project on the theme of attitudes and behavior. In this context, the employee satisfaction and the management is assessed by employees. Despite the introduction of this idea, no further actions are taken on this theme. The project on the theme of attitudes and behavior was conducted because it was an important management topic. But it seems that the project employees did not believed in the added value of this management topic.

The employees of the organization are in general very loyal, committed and prepared to do some extra work outside the standard procedures to accomplish the objectives of the organization and keep the secretary of state away from negative publicity. This attitude of employees is caused because the employees believe in the vision of the organization and are very committed to achieve the strategic organizational objectives. Despite this commitment of project employees, in practice the negative project results will not be immediately communicated to the project board and the responsibilities of the management are acquired by the project employees. Because of this attitude of project employees, the project results are mostly not adjusted according to the planning and control cycle. Therefore, no effective interventions can be made by management in order to achieve the intentioned management aspect or at least reduce the deviations with the actual values.

Closure and evaluation

After the finalization of projects a comprehensive test of the final products is granted decharge[14] to the project manager. Where Prince 2' is consistently applied by the project employees, best lessons are provided as a guide for new projects in the future. Within the organization, sharing knowledge and expertise are developed. The organization seeks to pursue consistently Prince 2'. Prince 2' is a tool to obtain project control but culture remains important to make organizational changes possible. People and culture are as described previously success factors to obtain project control. The internal education center is working currently on a plan for professional project managers and principals. This should obtain that project managers and principals are better equipped in the future to lead projects.

Project control and project management

Since January 2010, there is a functional structure, where controllers are located in different business units. Because of this functional structure, demands of the concern controller to the controllers are difficult to make. In addition, there is no coordination between functions, and disputes should be resolved at the top. With a hierarchy line, controllers are positioned at different business units, points of attention can be discussed openly through the hierarchy of business units.

Controllers are sometimes pressured by local management to make a window dressing of the project results. According to the concern controller, this in conflict with the principle and professional code, as the controller should always be independent, objective and have a critical role. In addition, project managers are often assigned by the project controller to a supporting role in preparing project reports and business cases. In the future the project managers must be held responsible for this. Ultimately, the project manager is responsible for the successful completion of the project.

A project controller must do what is expected from him. This means that the project controller should be critical and inform the concern controller independently on the progress of projects. In addition, project controllers should also participate in the board discussions, have analytical skills, respond proactively and communicate directly to top management. It would be ideal if the project manager and project controller have a good cooperation in order to operate the management control system. An independent, objective and critical view of the project controller is essential in this context. In addition, the project control should not be positioned hierarchical to the project manager

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[14] Decharge: exemption from liability of the project.

and in the project, in order to get a view from a different perspective. Currently the project control falls to the principal.

In order to obtain project control, it is important to have a result oriented culture with a good set of supporting methods and techniques. The discipline of project employees is essential in this context. In order to obtain project control it is important that the preliminary process is adapted well. It makes little sense to retrospective reports to show potential setbacks afterwards that could have been avoided with a well-run process. It is also important that the objectives of projects are clearly defined and that there is awareness within the organization of process thinking, especially for project employees.

Suggestions and ambitions

The organization has the ambition to perform projects that have a direct relation with the strategic organizational objectives. In addition, the interdependencies between projects should be understandable, given the limited financial resources. In this context, the financial framework should be prepared. In addition, the CIO should have a powerful mandate to make possible changes within the organization.

The customer should get a central role in the supporting organizations. Moreover, a culture of accountability should be put in place, whereby agreements are actually pursued within a set of pre-conditions. In addition, project employees should address each other on bad project results.

Without a clear and substantiated business case a project cannot be started in future. In addition, Prince 2' should consistently be pursued, whereby the funds are made available in phases (milestones), projects are performed in series of mini projects and an adequate scope management is used. It is important that the objectives, milestones and specifications are well defined and adequately monitored. Moreover, the progress reports should be presented, so quick adjustments of the planning and control cycle are possible. Finally the total cost of ownership[15], including management and operations should also be included in the business case, and the project results should be adjusted according to the planning and control cycle with effective interventions to obtain project control.

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[15] Total cost of ownership (TCO) is a financial estimate whose purpose is to help enterprise managers determine direct and indirect costs of a product or system.

Maturity model public project organization X

Maturity level 2 Levers of Control → Instrumental control mechanisms ↓	Boundary Systems (Hard control)	Diagnostic Systems (Hard control)	Interactive Control Systems (Soft control)	Belief Systems (Soft control)
Project Governance (2)	Available; After approval of the project brief resources are granted to the CFO. The project portfolio board decides about starting projects. Money, framework and guidelines are available for dealing with the organizational architecture and reporting. Controllers are hierarchically positioned in business units.	Available; Project Initiation Document (PID). Project brief portfolio board.	Present in design set up, but not yet in operation; Project portfolio board is set up. The mandate is missing by the CIO. Because of the missing mandate, changes can't be made within the organization. Input project controllers are used to make adjustments on the project results with the planning and control cycle.	Not available; Projects starts with a PID and project brief, but they are not fully substantiated and clear before starting of projects. Currently different stakeholders have different interest which makes it impossible to obtain optimal project control.
Project Portfolio Management (2)	Present in design set up, but not yet in operation; Since last year a project portfolio management board has been set up. Initiatives are discussed in the project portfolio management board.	Present in design set up, but not yet in operation;	Not available; Relationship between project portfolio management, adjustments of the planning and control cycle based on achieving of the strategic organizational objectives, is currently missing.	Not available; Objectives of the project portfolio management board are not clear and unambiguous. In addition, not every portfolio team is related to the strategic organizational objectives. Project portfolio board is tuned ad- hocly.

Maturity level 2 Levers of Control → Instrumental control mechanisms ↓	Boundary Systems (Hard control)	Diagnostic Systems (Hard control)	Interactive Control Systems (Soft control)	Belief Systems (Soft control)
Business Case Management (2)	Available; Only for the large projects (>€ 20 million or € 5 million with a high risk profile). Intended purpose, project plan, substantiation of expenses and benefits are assessed by experts of the project board. The principal and management boards are responsible for scope management, changes in scope. The principal is owner of the traffic light method and reports. Very irregular re- evaluation of business cases.	Available; Traffic light method Trend analysis (twice monthly). Standard project reports (large projects);	Present in design set up; Only for the large projects, which are expanded consistently and reported to the ministry, where the planning and control cycle is continuously adjusted on the project results. Based on the reports of other projects, there is not a specific objective to adjust the planning and control cycle on the project results. Business cases are not reassessed periodically.	Not available; Projects start mostly without a clear and well substantiated business case. Focus lies more on launching and fund projects. Also business cases are not monitored and re-evaluated periodically. Principal is using window dressing to avoid the secretary of state from any negative publicity.
Risk management (2)	Available; Only for the large projects (> € 20 million or € 5 million with an high risk profile); Risk paragraph is included in the business case (one of the ten chapters).	Available; Inventarisation of risks.	Present in design set up; Only for large projects which are expanded consistently and reported to the ministry, where the planning and control cycle is continuously adjusted based on a high risk profile of projects.	Present in design set up; At the start of a project, an inventarisation of (project)risks takes place.

Maturity level 2 Levers of Control → Instrumental control mechanisms ↓	Boundary Systems (Hard control)	Diagnostic Systems (Hard control)	Interactive Control Systems (Soft control)	Belief Systems (Soft control)
	Available;	Available;	Not available;	Not available;
	Tightly controlled on the performance of project employees. There are no consequences for bad projects performance of project employees.	Review employee satisfaction and performances of project employees.	Theme attitudes and behavior are performed	Hierarchical (top down approach).
			Knowledge and skills are present in design set up. Management wants to share and profit more from best lessons learned in the future.	Loyal and very committed to keep the secretary of state away from negative publicity.
	A project manager can be moved to another job if he delivers bad project results.		More professionalized education center has set up for project managers and principals so that they are well equipped to lead projects and obtain project control.	Discipline is missing. Appointments are not pursued. This is gradually changing within the organization.
People and culture (2)			Project employees do not confront each other on bad project results within the team.	Project managers and principles are not sufficiently capable to obtain project control.

Control typology:

Here the control typology proposed by Hofstede is the political control, because organizational objectives are ambiguous and also not defined specifically, in a measurable, achievable, realistic and timely (SMART) manner. The output is also very difficult to measure because well substantiated business cases are missing in the organization. In addition, no routine work is performed at the project organization and the interventions of effects are unknown. Therefore it is difficult in practice to make an effective adjustment of the planning and control cycles based on the project results.