# Control modes in IT project portfolio management: A multiple case study of four Danish local governments

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**Lars Kristian Hansen Ph.d. fellow**

**Center for IT Management**

**Aalborg University**

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# 1. Introduction

## *The increasing importance of IT Project Portfolio Management*

Contemporary organizations rely increasingly on Information Systems (IS) to stay competitive and adapt to fast changing environments implying that Information Technology (IT) is obtaining a more strategic role in organizational development. (McKenney. al, 1983). Project management has for some time been the most used principle for managing the development of IT in organizations (Kirsch, 1997; De Reyck, 2005), and organizations increasingly become a multi-project environment, because more work is organized by projects (Nieminen & Lehtonen 2008). Now, organizations experience that effective management of single projects do not fulfill organizational objectives sufficiently. Thus, today project portfolio management is considered to be one of the most important areas for organizational development (Morris & Pinto, 2007). However, research reveals that a large number of organizations are gaining below their potential in terms of creating value from their IT project portfolio (Weill &Vitale, 1999; Jeffery & Leviveld 2004; Kaplan, 2005; Weill & Aral, 2006) and that insufficient management of the IT portfolio is a significant reason (Jeffery & Leviveld, 2004).

## *An IS literature perspective*

IT portfolio management is defined as the important mechanisms enabling senior leadership to govern the portfolio of IT investments (Fitzpatrick, 2005), and IT portfolio management has been considered as best practice for some time now (Weill & Aral, 2006). Comprehensive research has been undertaken investigating how decisions regarding the IT portfolio of investments should be structured at the governance level, viz. by delegating equal rights of decision to the business executives and the IT executives (Ross & Weill, 2002; Weill & Ross, 2004). Research focus has now moved towards the

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linking mechanisms supporting the execution of those IT decisions by linking the decisions to concrete IT projects (e.g: Fonstad & Robertson, 2006) and activities (e.g: Jeffery & Leviveld, 2004; Weill & Aral, 2006;). Different arrangements (formal processes) may facilitate mechanisms such as: service level agreements, chargeback arrangements, arrangements for tracking of IT projects value, arrangements for measuring resources consumed, etc. (Weill & Ross, 2004). The arrangements mentioned may be divided into two different types: arrangements for management of the ongoing IT activities (services) and arrangements for management of IT projects (Fitzpatrick, 2005). As mentioned above today's organizations are coping with a more complex and faster changing environment, and therefore organizations increasingly adopt a strategic use of IT and not just a one-sided focus on minimizing operation expenses, as seen in the past (e.g: Lacity, M.C. & Hirschheim, R. 1995). New roles and mechanisms emerge: IT steering committees, increased top level participation of IT Executives, new reporting structures from IT, more intense involvement of the IT users (McFarlan et al, 1983). The roles of the IT Executive are changing as well - from being involved in technical operational mechanisms to becoming more and more involved in strategic development (Stephens et al, 1992). This development has been recognized for some years within the field of IS, nevertheless recent IS research is calling for more knowledge regarding the mechanisms linking the local projects to the strategic objectives within the organization (Fonstad & Robertson, 2006).

### *The stream of PPM literature*

Concurrently with the discussions within the IS field, a stream of literature has discussed portfolio management of projects (PPM) applying a bottom-up perspective by investigating PPM from a project level perspective. The PPM literature primarily consists of contributions from the fields of: Project Management, New product development (NPD), Research and Development (R & D) and Operational

Management. This stream of PPM literature focuses on developing models supporting practitioners. For example by describing the processes performed by a portfolio management office (e.g: Kendall & Rollins, 2003; Celar, 2007; Aubry et al., 2007) or describing the specific techniques used in PPM e.g.: risk management, cost benefit analysis, resource allocation, etc. (e.g: De Reyck et. al, 2005; Morris & Pinto, 2007). I argue that the PPM literature contains useful knowledge about the linking mechanisms mentioned earlier which are not fully exploited by the field of IS. This research takes advantage of the following insight from the PPM literature: PPM can be considered as a logical sequence divided in a cycle of different phases which are continuously repeated. This provides a dynamic notion of organizational linking mechanisms, and gives the opportunity to shed light on how different phases in PPM use different linking mechanisms.

However, as discussed in the following, the PPM literature has some limitations when it comes to explaining the linking mechanisms. It has been stated that the PPM literature gives little attention to the social mechanisms in the portfolio management of projects, and is biased towards a rational notion of organizational mechanisms (Blichfeldt & Eskerod, 2008).

### The position of the research

This research takes the perspective that portfolio management of IT projects is not just about technical mechanisms based on formal and rational mechanisms, but is also about social mechanisms involving people from different organizational units (Kirsch, 1997). To apply this perspective this research draws on control theory from organizational science. Control theory emphasizes both the formal and the informal mechanisms in organization's efforts to ensure that persons or groups work towards a common set of organizational goals (Ouschi, 1979). Control theory is originally designed to investigate complex, non-routine tasks in organizations (Kirsch, 1996) and has later been adopted by IS research to

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explain complex management of IS (e.g: Choudhury & Sabherwal, 2003; Piccoli & Ives, 2003; Kirsch, 2004; Dibbern et. at 2008; Rustagi et. al, 2008; Rai, 2009; Persson, et al, 2009). Nevertheless, control theory has not yet been used to investigate portfolio management of IT projects.

## *The contributions of the research*

The research provides two contributions to the IS field. The first contribution is to increase empirical knowledge regarding the linking mechanisms between overall organizational objectives and the local IT projects, and control theory is used as a lens to investigate these mechanisms. The second contribution to the IS field is to provide a dynamic understanding of the linking mechanisms connecting organizational objectives with the local IT projects. By drawing on the knowledge from the PPM literature regarding how linking mechanisms in portfolio management can be considered as a cycle of different phases, a dynamic model of the mechanisms is constructed.

Furthermore, the research contributes to the PPM literature providing knowledge about how different IT PPM concepts and the organizational context interact. This is done by asking organizational executives *why* they adopt some mechanisms and omit others.

IT portfolio managers in practice (especially CIOs) may benefit from the research by enhancing their knowledge about the specific disciplines of IT PPM. Although almost all CIO's perform some sort of IT project portfolio management, the present literature review found only one academic article (De Reyck et. al 2005) and two management handbooks (Fitzpatrick, 2005; Bonham, 2005) focusing explicitly on the specific disciplines of IT PPM.

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## The research questions

Based on the practical importance of IT project portfolio management to a growing number of organizations, the lack of knowledge regarding linking mechanisms in the IS field and the lack of knowledge regarding IT PPM, this research aims to answer the following two research questions. The first question being: *How do organizations perform control in IT PPM?* The second question being: *Why do organizations structure their control in IT PPM as they do*? To answer these questions the research will conduct four case studies of organizations in which IT is beginning to play a more strategic role.

## The structure of the paper

This paper proceeds as follows. Section two discusses what is known in the management literature regarding portfolio management of IT projects. This discussion shows that IT PPM is a complex term drawing from different forms of management. On this background the definition of IT PPM is constructed, which is the area of concern of this research. The definition is used as a starting point for a concept-centered review of the available IT PPM literature. The articles found in the review are synthesized to provide a dynamic model of the mechanisms in IT PPM. Section two is closed by analyzing the assumptions of the IT PPM literature and considers how the research can contribute to the exiting literature.

Section three introduces the theoretical framing, which is control theory. This section claims that control theory is useful to understand central aspects of IT PPM and that control theory has not yet been used to understand management at the portfolio level.

Section four positions the research within the interpretive IS research tradition and introduce the case study method as the applied method of the research. Section five discusses the analysis, showing how the research aims at answering the *how* and *why* parts of the research question. Section six introduces the four cases in the research and provides some brief consideration regarding the collection of data. Expected findings of the research are discussed in section seven. Section eighth shows the references used. Finally, appendix A provides a brief explanation of how the research is related to a larger Danish research project.

## 2. Background literature

### 2.1 The Portfolio perspective

The literature describes Portfolio management of information technology (IT) as the important mechanisms that enable senior organizational leadership to govern organizational IT investments (Fitzpatrick, 2005). Kaplan (2005) compares the portfolio management perspective with the management conducted by the control tower in an airport. Some form of management must control the departure and arrivals of the airplanes otherwise the airport activities will be ineffective, even though the individual employee is highly skilled.

### 2.2 Portfolio Management: the origin of Portfolio Management

The discipline of performing Portfolio Management of IT has emerged from the tradition of financial investments and is about how organizations, typically companies, increase their value by buying the optimal mix of stocks or bonds. To be able to do so an organization may employ Portfolio Management methods using the insights from Modern Portfolio Theory (MPT). MPT stems from the article *Portfolio*

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*selection* by Markowitz (1952) which became widely acknowledged for formulating two main principles in MPT. The first principle is diversifying investments across risk levels. The second principle is tailoring the investment to the strategy of the organization (Fitzpatrick, 2005). Other businesses than organizations dealing with finance investment have now adopted the insights from Portfolio Management. For example: drug companies managing the portfolio of drug development programs; construction firms managing the portfolio of construction projects (Morris & Pinto, 2007); accounting firms managing their portfolio of contracts (Bonham, 2005); manufacturing firms managing their portfolio of New Product Developments (NPD) projects; high tech firms managing their portfolio of Research and Development(R & D) investments (Morris & Pinto, 2007). In the 1980s organizations began to adopt IT Portfolio Management (IT PM) methods to manage IT investments (Fitzpatrick, 2005) and is now widely adopted by organizations (Weill & Aral, 2006).

## 2.3 Portfolio Management of different assets

Morris & Pinto (2007) discuss how different kinds of portfolio management use different methods and techniques. A portfolio of R & D investments can be characterized by being exposed to great technical risks, because R & D is about creating innovations. Little organizational experience with a specific technology is a significant reason for enduring high risks (McFarlan, 1981). Research shows that nearly half of the R & D projects must be closed before reaching the project objectives (Morris & Pinto, 2007). This explains why portfolio management of R & D projects put a lot of effort in risk calculation techniques. Conversely, firms in the construction business are experiencing a lower degree of technical risks, however depend on the supply of labor and thus put emphasis on maintaining strong relations to their employees. Portfolio management of government agencies (and non-profit organizations) is met with another set of challenges; they may aim at using financial or cost benefit analyses (Morris &

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Pinto, 2007), however, government agencies (and non-profit organizations) have broader and more multifaceted strategic objectives (Weill & Ross, 2004) making it difficult to compare projects based on mere financial aspects. Thus, these types of organizations have a wider range of assets providing value to the organizations strategic objectives (Kaplan, 2005). For example the objectives of government agencies are to: provide public security, provide health care, satisfy the demands of the political stakeholders, etc. (Weill & Ross, 2004).

Portfolio management is performed in various sectors/industries which differ significantly, however, literature does not agree about which methods for portfolio management are most efficient or appropriate to what sectors or industries (Morris & Pinto, 2007). The following will discuss the experiences from the area of NPD that has undertaken a comprehensive amount of PPM research.

### *NPD – a well investigated kind of portfolio management*

A well investigated area in PPM is NPD which stems from the work by R. Cooper and his colleagues, (e.g.: Cooper et al, 1999; Cooper et al, 2000; Cooper et al, 2002; Cooper & Edgett, 2003; Cooper, 2004 Cooper, 2006, Cooper, 2008). The work by Cooper & Edgett (2003) uses data from more than 100 problem detection sessions held in businesses dealing with NPD (Cooper & Edgett, 2003). One of the most interesting findings of their research is that a lot of companies using NPD experience "the resource crunch", meaning that an organization has too many projects drawing on too little resources. Cooper & Edgett (2003) emphasize how people at different organizational levels cope with "the resource crunch". For example senior managers explain how they experience a significant pressure of constantly showing results, implying that they constantly have to deliver results. The fact that they feel this pressure makes them reluctant to kill projects especially if the organization has invested a great

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amount of resources in the project (Cooper & Edgett, 2003). Furthermore, senior executives have "pet" projects which they believe in and which are prestigious to them and they will thus lose face if such projects are closed down. This has the unintended consequences that organizations have projects which are only kept alive by an absolute minimum of resources, because they will be to embarrassing to officially close down.

The above section has discussed what is known about portfolio management of different kinds of portfolios, and has claimed, that portfolio management of NPD is well investigated. Following section will discus what is known of portfolio management of IT

## 2.4 Portfolio Management of IT (IT PM)

According to Fitzpatrick (2005), IT Portfolio Management (IT PM) is the specific IT related mechanisms regarding a company's portfolio of IT investments. Fitzpatrick (2005) describes the content of a portfolio of IT investments as: *a collection of information about investment in, or that involves, IT. Every significant IT asset is described in the IT portfolio, along with every initiative, program, project, business activity, outsourcing contract, and license that involves, relies on, or make use of IT* (Fitzpatrick, 2005). Portfolios of (IT) investments are challenging because they are characterized by having, great uncertainty, are affected by changing business conditions, and a long payback time (Bardhan et al., 2004), which makes it more difficult to get stakeholders commitment (Cooper & Edgett, 2003). The literature reports about a paradox regarding portfolio management of IT investments, viz. that increased IT investments not always result in increased productivity (Maizlish & Handler, 2005). Based on an investigation of 130 companies, Jeffery and Leliveld (2004) show that organizations struggle to demonstrate business gains from information technology investments. Jeffery & Leliveld (2004) emphasize how the lack of communication between the CIO and non-IT executives

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means that IT investments fail to reach their strategic objectives. Furthermore, Jeffery & Leliveld (2004) show how organizations' lack of a centralized overview of the IT portfolio results in bad investments and the development of redundant applications (Jeffery & Leliveld, 2004). Their studies emphasize the importance of applying the mechanisms of IT Portfolio management and they are supported by Weill & Aral (2006). These scholars use the term IT savvy to describe, what they describe as: the importance of interlocked business practices and processes in organizations. Weill & Aral (2006) regard IT savvy as an important condition for organizational benefit of their portfolio of IT investments, and show how an organization's degree of IT savvy influence the type of projects the organization may benefit from (Weill & Aral, 2006).

## 2.5 Two different assets in Portfolio Management of IT

Portfolios of IT investments can be divided into two different assets: IT projects and ongoing IT activities (Fitzpatrick, 2005). The latter concerns maintaining and providing the existing organizational IT services and this effort is performed by ongoing and repetitive operations. Conversely, the activity of conducting projects is a temporary endeavor, because projects have a beginning and an end (Archer & Ghasemzadeh, 1999). In recent years a stream of literature on project portfolio management has emerged (PPM) both from consulting (e.g.: Kendall & Rollins, 2003; Wideman 2004; Morris & Pinto, 2007; Moore, 2010) and from academic journals, namely from the fields of: NPD, R&D and project management. But this research argues that only little is known in literature regarding project portfolio management of IT projects (IT PPM). Bonham (2005) argues for the importance of IT PPM due to its' significant strategic organizational importance. The portfolio of IT projects supports the efforts of the business units to comply with organizational objectives, but these objectives change rapidly in an increasingly global, competitive, and fast changing world (Nieminen & Lehtonen, 2007).

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## 2.6 Defining the area of concern of the research: IT PPM.

As earlier mentioned it was only possible to identify few contributions regarding IT PPM in the rigorous concept-centered literature review of this research (Webster & Watson, 2002). One of the few examples is the literature review by De Reyck et. al (2005) where the scholars identify the concepts available in the literature. The concepts found were synthesized to a framework of best practices regarding IT PPM and finally, the scholars identify a positive relation between organizational use of the concepts identified and better organizational performance of IT projects. However, the article by De Reyck et. al, uses little time explaining how the literature applied has been found and how IT PPM is defined. Because of the lack of IT PPM definitions available in the literature this research will construct a definition from the existing body of knowledge. This research defines IT PPM as management of*: a group of [IT] projects that are carried out under the sponsorship and/or management of a particular organization. These projects must compete for scarce resources (people, finances, time, etc.) available from the sponsor, since there are usually not enough resources to carry out every project proposed which meets the organization's minimum requirements on certain criteria such as potential profitability, etc*" (Archer and Ghasemzadeh, 1999). This definition consists of the acknowledged definition of PPM by Archer and Ghasemzadeh, (1999) and "IT" is inserted (encircled by brackets). The research defines IT project as: *the implementation or modification of a business unit's access to information using technical media such as computers, cables or phone switches* (Bonham, 2005).

## 2.7 Synthesizing what is known in the literature regarding IT PPM

In this section I build a framework consisting of what is known about IT PPM. As mentioned, the articles used in the framework have been found by using the concept-centered literature review conducted as part of this research. The structure of the framework is based on an often used distinction of the PPM literature, which divides project portfolio management into three phases; a strategic consideration phase, a portfolio selection phase and a post project portfolio selection phase (Archer & Ghasemzadeh, 1999; Bonham, 2005; Morris & Pinto, 2007). Theses phases are assumed to be performed with particular intervals (Jeffery & Leviveld, 2004), for example when the decisions makers gather regularly for the portfolio board meeting (portfolio management committee) (Morris & Pinto, 2007). Some models in the PPM literature, simplify the mechanisms of PPM, by assuming that all projects start at the same time. But Morris & Pinto (2007) state that mechanisms in project portfolio management are more complex. At a given time some projects will be in the portfolio pipeline and some projects will be almost finished. By using the airport analogy these mechanisms may be explained by the activities taking place in the control tower: The control tower control plains that are ready for take off, and controls plains that are about to land, but the control tower will communicate with all plains, when the weather forecast predicts bad weather conditions, change in routes, etc.. Below you will find the review of the IT PPM literature structured into the three phases.

### *Strategic considerations in PPM*

The PPM literature emphasizes a range of preconditions for PPM which must be dealt with before strategic considerations can be made. The article by Lycett et al. (2004) emphasizes the importance of a properly and well communicated organizational strategy, the involvement of business leaders and choice of techniques for the portfolio selection process (Archer & Ghasemzadeh, 1999; Morris & Pinto,

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2007). As a precondition for PPM, Jeffery & Leliveld (2004) emphasize that the IS managers are rightly skilled with regard to their ability to make the most relevant financial calculations. A general notion in the literature regarding preconditions is the notion of a centrally controlled inventory of the portfolio of IT projects (Jeffery & Leviveld 2004) (De Reyck et al, 2005). Platje & Seidel (1993) have a different view of the preconditions of PPM and argue that portfolio management has intrinsic mechanisms creating vicious circles of planning and control. Platje & Seidel (1993) consider portfolio management in an organization as consisting of three parties holding conflicting interests: the senior management of the organization, the employees attached to the organizational project (perhaps placed in different departments), and the different organizational departments. Senior management controls the portfolio management and will aim at centralizing and formalizing the responsibility of the organizational projects, but this has unintended consequences decreasing motivation and involvement of the departments and the employees participating in the projects. The different parties will be encouraged to promote their own interests and hinder open communication. As a countermove senior management will increase the degree of formalization and control and the vicious circle of bureaucracy will roll and create frustration: the project managers and departments are frustrated by the rigid processes not stimulating organizational flexibility, and the senior management is frustrated by the lack of control despite portfolio management providing detailed information and formalized processes. Platje & Seidel (1993) state that it is possible to overcome the vicious circle by creating an "intermediate forum" and thereby strengthening the informal relations between the three parties and bridging the conflicting interests by consensus.

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### The portfolio selection phase

There is a lot of literature regarding the selection phase of portfolio management. Basically this stream of literature is concerned with the simultaneous comparison of a number of projects on particular dimensions allowing the projects to be ranked and the highest ranking project to be selected (Archer & Ghasemzadeh, 1999; Morris & Pinto, 2007). The literature provides a range of techniques going from simple matrixes to advanced optimization models and economic models. First, an example of the comparatively simple matrixes is by McFarlan (1981). This contribution is widely recognized and offers the categorization of projects in different project types with each type of project demanding a specific type of management effort, such as: external integration, internal integration, formal planning or formal control (McFarlan 1981). Now, a brief presentation of the vast amount of advanced and sophisticated models and techniques to underpin the decision process: these basically have two analytical levels: an analytical level calculating the costs and benefits of a project viewed as a relatively isolated endeavor providing a range of techniques such as: Return On Investment (ROI) or Net Percent Value (NPV), Internal Rate of Return (IRR), or Economic Value Added (EVA) (De Ryeck et. al, 2005). An analytical level considering the whole portfolio of projects offering a range of sophisticated optimizing calculations including project interdependencies (e.g: Bardhan et al. 2004) and mitigate for example the "resource crunch" mentioned earlier (Cooper & Edgett, 2003; Blichfeldt & Eskerod, 2008)

### Post project selection phase

The literature dedicates less time on the processes beyond the selection of projects, even though Weill & Aral (2006) state that a lot of organizations miss the opportunity to gain valuable learning from post project reviews. Jeffery & Leviveld (2004) describe how the portfolio must be continuously synchronized during the project life cycle and how the CIO must have different instruments to measure

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performance over the time span of the individual project. The CIO could for instance measure risk and return in the early stages, measure earned value in the delivery phase and measure employee productivity in the maintenance phase (Jeffery & Leviveld 2004). Verhoef (2002) shows how organizations face deflected costs from completed IT projects, because IT project gives deflected costs for maintaining and phasing out the application. According to Verhoef (2002) is the total costs of a project may be fifteen times the amount of the initial costs. Following this argument managers must carefully select projects otherwise the post selection phase will experience a tsunami of deflected expenses (Verhoef, 2002).

## 2.8 Analyzing the IT PPM framework to find a path for further research

This section will analyze the IT PPM literature presented above, and this is often done by distinguishing between interpretive and positivist theory (Walsham 1995a). The analysis of the IT PPM literature shows a strong predominance of articles using the positivistic perspective (Blichfeldt & Eskerod, 2007), defined as research *seeking to explain and predict what happens in the social world by searching for regularities and causal relationships* (Burrell & Morgan 1979). The PPM literature has a great amount of sophisticated PPM (namely decision) models advising organizations what to do (Archer and Ghasemzadeh, 1999). The positivistic perspective is criticized for having little focus on the empirical investigation of what really goes on in organizations, Blichfeldt & Eskerod (2007). The positivistic perspective may furthermore be criticized for applying a perspective which is too naive assuming that organizational mechanisms may be controlled by cybernetic modes of control (Burrel & Morgan, 1979). Verhoef (2002) may be used to exemplify this approach to IT portfolio management which is inspired by the mechanisms at a stock market: *A portfolio management approach where*

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*decisions on whether to invest in IT are based on potential returns, and decisions to terminate or make*

*additional investments are based on performance much like an investment broker is measured and*

*rewarded based on managing risk and achieving results* (Verhoef, 2002). Only few contributions of the

IT PPM literature deviate from the main stream of this rational notion of literature regarding IT PPM.

The best example is Blichfeldt & Eskerod (2008) who state that: On the one hand, the senior

management needs an overview of all projects and activities in the organization for the allocation of

resources to be efficient. On the other hand senior management embracing all projects and activities in

the portfolio management will have a range of challenges: Firstly, the senior executives will have

limited cognitive capacity and time to spend on portfolio management. Secondly, it will be very

difficult to estimate the total amount of organizational resources spent, and especially the identification

and administration of small projects will be a costly and bureaucratic burden to the organization.

Thirdly, the employees will find self respect and self-realization in these projects because the outcome

of the projects is visible to the employee, and a strict control will take away the motivation and

creativity of the employees.


Based on the analysis above it may be argued that the interpretive perspective is under-exploited in

investigations of IT PPM. To handle this epistemological monism (Schultze & Leidner, 2002) this

research will apply a theoretical perspective assuming that mechanisms in IT management is not just

about technical processes of managing IT, but also about social processes involving people from

multiple organizational units (Kirsch, 1997; Orlikowski, 2000). As mentioned above the work by De

Reyck et. al (2005) and Bonham (2005) are inspiring and insightful, however, following the call by

Blichfeldt & Eskerod (2008) for more research regarding project portfolio management that explore

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what organizations actually do rather than investigating what organizations ought to do, this research will concentrate on *how* the organizations conduct portfolio management of IT projects and *why* the specific mechanisms are used? The following section will discuss the theoretical framing of the research which will lead to the research question.

# 3. Theoretical framing

## 3.1 Control theory

Control theory is an influential theoretical perspective used by articles in top IS journals to understand mechanisms of IS management. Control theory uses the notion *modes of control* to describe all attempts to ensure that individuals in organizations act in a way that is consistent with organizational goals and objectives (Kirsch, 1997). I will argue that there is a strong compliance between the above stated definition of IT PPM and the interest of control theory where the definition of IT PPM was defined as: *"a group of [IT] projects that are carried out under the sponsorship and/or management of a particular organization"* (Archer and Ghasemzadeh, 1999). Thus control theory emphasizes the mechanisms combining the individual activities with the sponsorship and/or management of a particular organization.

Control theory was invented by Ouchi (1979) and Eisenhardt (1985) who originally developed this widely recognized theory to apply to the field of management science. Control theory has proven useful to describe the mechanisms of managing complex tasks in organizations. Later the theory has been adopted by IS research  to investigate: control of IS projects (Kirsch, 1997); control of outsourced IS projects (Choudhury & Sabherwal, 2003); control of virtual IS development teams (Piccoli & Ives,

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2003); control of IS development projects in a global contexts (Kirsch, 2004); control of IS off-shoring (Dibbern et. at 2008; Rai, 2009); control of geographically distributed IS projects performing risk management (Persson, et al, 2009); control of client management regarding the IS vendors (Rustagi et. al, 2008). To my knowledge, however, there is no prior IS research or research in the field of PPM, that has investigated control-mechanisms of IT PPM. The section below will argue that IT PPM creates a special, complex and exciting context for control mechanisms to take place which is different from the IS management described above.

Control plays an important role in managing projects by integrating the participants (Kirsch, 1997). The concept of control is based on the premise that the *controller* and the *controllee* have different interests. These different interests will be overcome by the controller's *modes of control* (Tiwana & Keil, 2009). *Modes of control* may distinguish between formal and informal mechanisms. Formal *modes of control* are defined as *Behavior control* and *Outcome control. Behavior control* consists of articulated roles and procedures and rewards based upon those rules. *Outcome control* is mechanisms for assigning rewards based on articulated goals and outcomes. The informal modes of control are carried out by the control modes labeled as *Clan* and *self. Clan* are the mechanisms of a group sharing common values, beliefs, problems, and these mechanisms work through activities as hiring & training of staff, socialization etc. The control mode of the *Self* is about individually defined goals and can be carried through the mechanisms of individual empowerment, self management, self set goals, etc. (Kirsch, 1997).

| Control mode | Key characteristics | Antecedents conditions | Examples of mechanisms |
|---|---|---|---|
| Behavior | Rules and procedures. Articulated rewards based on following rules & producers. | Knowledge of appropriate behaviors, knowledge is observable | Job descriptions |
| Outcome | Outcomes and goals articulated. | Outcome measurability | Define target |

| | | | implementation date |
|---|---|---|---|
| | Rewards based on producing outcomes & goals. | | |
| Clan | Common values, beliefs & problem solving philosophy. Identification & reinforcement of acceptable behaviors. | Appropriate behavior. Unknown outcomes. Not measurable. | Socializations |
| Self | Individually defined task goals or producers. Individual monitoring, rewards partly based on the individual's self control and skills. | Complex or non-routine task. Performance evaluation ambiguity. Lack of required rules or procedures. Desire to exercise self control. Individual ability. | Self-set goals |

**Table 3.1 Adopted from Kirsch (1997)**

## 3.2 The distribution of roles and level of analysis in prior research

The text above has discussed by which mechanisms the *controller* can direct the *controllee*. In the following I raise the question: who controls who in IT PPM? The definitions of *modes of control* have the implicit notion that control will be conducted in a top-down manner, assuming organizational goals and objectives are defined by top management and executed by the means of *modes of control*. But as organizations face an increasingly more competitive and fast changing global environment, organizations adopt less hierarchal ways of organizing work (Sinha & Van de Ven, 2005) and the increased use of projects as a way to organize work is one of them.

### *New roles emerge*

When organizations adopt a project portfolio approach a new set of roles emerge in organizations implying a new form of coordination and negotiation between projects, business units and senior management (Platje & Seidel, 1993). IT PPM provides a context where the IT portfolio manager (mostly the CIO) becomes the *controller* and the business units responsible for the local projects

become the *controllees*. Thereby, the IT project portfolio manager is expected to control a portfolio of IT projects placed in different local business units in an environment of local stakeholders.

### Is portfolio management of IT projects - an arena of conflict?

The IS literature shows that the new role of the IT portfolio manager as a controller can be can difficult and complex. It has been discussed for some time that IS managers (CIO's) increasingly take on a more strategic role in organizations (Stephens et. al, 1992), and that IS managers increasingly need social, political, business, and IS intelligence (Karahanna & Watson, 2006), and how the authority of the IS manger is strongly dependent on the support from the organizational top management (Preston, 2008).

The project management literature reports that project portfolio management may cause unintended consequences such as: unwanted accountability, unnecessary bureaucracy (Blichfeldt & Eskerod, 2007; Platje & Seidel, 1993). Various studies of the project management literature have shown that the projects of the portfolio must compete for scarce resources (people, finances, time, etc.) available from the sponsor, since there are usually not enough resources to carry out every proposed project which meets organizational requirements (Archer & Ghasemzadeh, 1999; Cooper & Edgett, 2003; Elonen & Artto, 2003; Blichfeldt & Eskerod, 2007) and this often causes disagreement regarding resources allocation between projects (Laslo, 2009).

## 3.3 The dynamic of control in IT PPM management

Prior research has shown that *modes of control* at the project level mostly change through the different phases of IS projects (Choudhury & Sabherwal, 2003; Kirsch 2004) and it is assumed in this research that the portfolio level has a similar dynamic. First, this section discusses what the IS literature has explored about change in *modes of control* from investigations made of dynamics at the project level.

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Then the present section will draw on knowledge about phases in portfolio management from the project management field. This will be synthesized to a model that may formulate research questions regarding control mechanisms in IT PPM, not yet addressed in the field of IS or the field of project management.

Choudhury & Sabherwal (2003) investigate dynamics in *modes of control* in outsourced projects. They show how the early phases are dominated by outcome control and later phases are dominated by behavior control. Kirsch (2004) elaborates on the notion of the dynamic of control modes and finds that IS developments in large global projects can be divided into three phases. The first is the *initiation and requirement determination phase* which establish high-level goals and project scope. The second is the *development phase* providing the detailed requirement, design, coding and testing. The third is the *implementation phase* where the software is installed and the business oriented activities such as changing businesses processes workflows and training are conducted (Kirsch, 2004).

By drawing on the prior research from the field of IS and the field of project management this research assumes that the portfolio level has a similar dynamic and that a static view will not be sufficient to explain control mechanisms in IT PPM. As shown above there is a recognized distinction in the project management literature to consider PPM as being conducted in three phases: *Strategic considerations phase, Portfolio selection phase, Post selection phase* (Archer and Ghasemzadeh, 1999).

Based on this dynamic understanding of IT PPM this research will use control theory to focus on *modes of control* in different phases of IT PPM and the research aims to answer the following research

question: *How do organizations perform control in the three phases in IT PPM, and why do organizations use those particular modes of control?*. The figure below illustrates that the research investigates each of the phases separately.
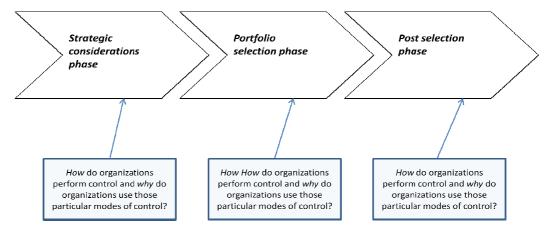


**Figure 3.1: Adopted from Archer & Ghasemzadeh (1999) and Kirsch (2004)**

# 4. Methodology

This research adopts the position of interpretive IS research, assuming that our knowledge of reality is a social construction made by human actors (Walsham, 1995b). As mentioned above this addresses research social issues as well as instrumental management techniques. This duality in the research, considering both technical artifact and social issues, has been accepted by interpretive researchers in the field of IS for some years now (e.g: Orlikowski, 2000).

## 4.1 Research method

### The case study design

The interests of the research are *how* and *why* organizations use particular *modes of control* in IT PPM. For this purpose the case study method is found suitable. The research uses the arguments from Yin (2009) to describe the method used in the case study. It has been stated that Yin (2009[1989]) uses an implicit positivistic stance in his description of case studies (Walsham, 1995a). But this research, follows the argument by Walsham (1995a) stating that the *how* and *why* questions suggested by Yin (2009), can be used by interpretive as well as positivist research (Walsham, 1995a).

The research has chosen four cases assumed to be *representative* (Yin, 2009) of the domain of the research. As mentioned above, the domain of the research is defined as organizations which used to put little emphasis on IT as a strategic instrument in organizational development, to now put more intense emphasis on IT as an instrument of strategic organizational development. All four cases in the research have renounced, that they are putting more emphasis on IT as a strategic instrument in the future organizational development, and they are furthermore taking concrete initiatives regarding the development of IT PPM (Pedersen & Hansen, 2010).

### Multiple case study design

A multiple case study design is applied as it is seen as a way of strengthening the applicability of the results. In multiple case study design the generalizability can be strengthened by *replicating* findings from one case in other cases.  The research may then argue more convincingly that the findings constitute a general phenomenon and is not restrained to a local unique finding (Yin, 2009). The multiple case study design also advance by providing a greater variation in data, giving the opportunity

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to explore a more vide range of *control modes* and argument for why the organizations uses those particular *modes of control.*

## *Embedded case study design*

This research applies an *embedded* case study design by investigating two logically defined subunits in each case (Yin, 2009). The *embedded* design is in contrast to a *holistic* design which may be utilized to investigate a more global nature of a case. This research takes advantage of the ability of the *embedded* case designs to provide a more clear research focus, by being more explicit about the topic of the analysis (Yin, 2009). Two levels of analysis have been indentified both centered around the activities of the manager of the IT project portfolio which based on the literature, this research assumes is a role held by the CIO (Fitzpatrick, 2005; Maizlish & Handler, 2005).

The figure below illustrates the two embedded units of analysis in the research and their focus. The first embedded unit is the *modes of control* connecting the CIO and the senior executives in the organization. The interest is to investigate *how* the senior management performs control over the CIO. As stated above, the organizational authority of the CIO is strongly dependent of the relation to the senior management (Prenston, 2008). This embedded unit of analysis is assumed to set important conditions for the second embedded unit of analysis, which is about the *modes of control* connecting the CIO to the IT projects in the portfolio. The research assumes that a vast amount of the IT projects in the cases investigated are controlled by stakeholders in different business (Kirsch, 1997) providing complex conditions for the project portfolio management of the CIO. Furthermore, the literature states, that organizations often have projects which senior management (Blichfeldt & Eskerod, 2007), and presumably also the CIO know nothing about.
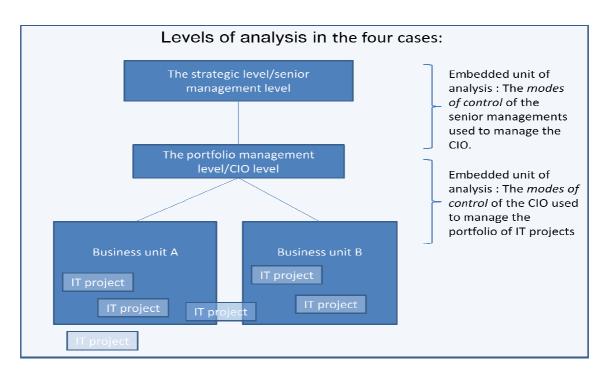
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**Figure 4.1: The two embedded levels of analysis in the four cases**

## 4.3 The research cases: four Danish local governments

The cases chosen in the research are four Danish local governments. These local governments participate along with another seven in the research project named the DISIMIT-project. The DISIMIT-project and how this is related to this research is briefly described in appendix A.

| Local government | No. of employees |
|---|---|
| Local government A | 18,000 |
| Local government B | 5,000 |
| Local government C | 6,000 |

| | |
|---|---|
| Local government E | 5,400 |

**Table 4.1: The local governments in the research**

The four local governments constitute four out of a total amount of 98 Danish local governments. These cases can be argued to be similar to a the overall pool of local governments because they face the same IT related requirements from central government, they use vastly the same vendors, they all work under the same rules and regulations, they all have to provide the same services to the citizens, and the IT managers all take part in the same communities, etc. Among local governments there is a tradition of collaboration, of establishing common solutions, and of knowledge sharing that, for obvious reasons, do not take place among private sector organizations (Pedersen & Hansen, 2010).

On the other hand these four local governments also have some characteristics that make them *unique*. The four cases taking part in this study mentioned differ in terms of: maturity – they are perceived to be among the most mature local governments from an IT management maturity perspective: they differ in terms of motivation - they are explicitly highly motivated for change and improvement of IT PPM (Pedersen & Hansen, 2010). Thus, it is assumed that the experiences of these local governments might serve as inspiration for other local governments. Furthermore, these organizations may be characterized as *turnaround organizations* (McKenney, 1983); however, not all Danish local governments may be characterized as turnaround organizations. However, consultancy reports state that IT portfolio management used as a strategic driver is extremely important to Danish organizations (Ramboll, 2010) although there is room for improvement as only 17% of the Danish organizations have formalized their portfolio management (Ramboll, 2008).

## 4.4 Collection of data

This research will mainly use data from interviews and available documentation (Yin, 2009) to provide empirical grounding to answer two research questions: *How* do organizations exercise control in IT PPM and *why* are the particular modes of control used? In the following, the collection of the data is discussed, and the research questions are discussed separately in two parts, because answering the *how* and *why* part of the questions demands two different approaches.

### *Collecting data for how the cases use modes of control in IT PPM*

Answering the first research question relies on the theoretical framing as a guide for identifying the *modes of control* used in the IT PPM of the case organizations. The advantage of using this theoretically guided approach is that the theoretical knowledge accumulated will provide a high focus research. The pitfall of employing this approach is that the researcher will only see what the theory suggests (Walsham 1995a).To minimize possible pitfalls, the research will develop a data collection technique where the initial part of the data collection will emphasize how the respondents describe the linking mechanisms in each of the two *embedded* units of analysis. Walsham (1995) states that in interpretive studies it is desirable to preserve a considerable degree of openness to the field data and being willing to adjust the initial theoretical assumptions accordingly. The next step of the data collection pertaining to the first research question will be deductive ensuring that the specific *modes of control* are captured. The following table will be used to structure the data collection in the two embedded units of analysis. The table below illustrates how the research expects to capture data about the *modes of control* exercised by senior management to control the CIO.

| Number | Description of | Controller (strategic/senior | Controllee | Phases of IT portfolio management |
|--------|----------------|------------------------------|------------|-----------------------------------|

| | the mechanism | level) | | (precondition, selection, post selection) |
|---|---|---|---|---|
| 1 | Description of the mechanisms found will be inserted | Presumably the CEO | Presumably the CIO | Phases of IT PPM will be inserted |
| 2 | Description of the mechanisms found will be inserted | Presumably the CEO | Presumably the CIO | Phases of IT PPM will be inserted |
| 3 | Description of the mechanisms found will be inserted | Presumably the CEO | Presumably the CIO | Phases of IT PPM will be inserted |
| 4 | | | | |

**Table 4.2: Table for collecting data regarding the mechanisms between the strategic level/senior manager level and the portfolio manager level**

The table below is quite similar, but illustrates how the CIO uses *modes of control* to manage the IT

projects (often placed within the local business units).

| | Description of the mechanism | Controller | Controllee | Phases of IT portfolio management (precondition, selection, post selection) |
|---|---|---|---|---|
| 1 | Description of the mechanisms found will be inserted | Presumably the CIO | Presumably chairman of an IT project or a project manager | Phase of IT PPM will be inserted |
| 2 | Description of the mechanisms found will be inserted | Presumably the CIO | Presumably a chairman of an IT project or a project manager | Phase of IT PPM will be inserted |
| 3 | Description of the mechanisms found will be inserted | Presumably the CIO | Presumably a chairman of an IT project or a project manager | Phase of IT PPM will be inserted |

| 4 | | | | |
|---|---|---|---|---|

**Table 4.3: Table for collecting data regarding the mechanisms from the portfolio manager level to the project level within the local business units**

### *Identifying why organizations use the particular modes of control*

The processes and means for collecting data for this research questions are iterative and less predictable. One possibility which I am considering is using the methods of *grounded theory* (Corbin & Strauss, 2008) which require the researcher to use an iterative data collecting process building a theoretical explanation.

## 5. Analysis

This section will also be structured by the two different techniques to address the *how* and *why* of the research question. First this section will show how the research analyses: *how* organizations use *modes of control* in IT PPM. The second section will show how the research analyses the *why* part of the research question.

*Analyzing how organizations use modes of control to perform IT PPM control*

The table below shows that the analysis will be structured by the theoretical proportions from control theory. The first column is divided into: Outcome, behavior, clan, self (Kirsch, 1997). The second column is divided into the three phases, on the background of the advice from the PPM project literature (Archer & Ghasemzadeh, 1999).

| Mode of control | Phase | Mechanism |
| --- | --- | --- |
| Outcome | Pre selection phase | Data from the cases will be inserted |
| | Selection Phase | Data from the cases will be inserted |
| | Post selection | Data from the cases will be inserted |
| Behavior | Pre selection phase | Data from the cases will be inserted |
| | Selection Phase | Data from the cases will be inserted |
| | Post selection | Data from the cases will be inserted |
| Clan | Pre selection phase | Data from the cases will be inserted |
| | Selection Phase | Data from the cases will be inserted |
| | Post selection | Data from the cases will be inserted |
| Self | Pre selection phase | Data from the cases will be inserted |
| | Selection Phase | Data from the cases will be inserted |
| | Post selection | Data from the cases will be inserted |

**Table 5.1: The structure of the analysis of *how* the cases use modes of control in the different phases of IT PPM**

*Analyzing why organizations use particular modes of control*

The research will search for patterns regarding tendencies to use particular *modes of control*, and relate those to the different phases of IT PPM (Archer & Ghasemzadeh, 1999). Building empirically grounded explanations this part of the analysis will apply the techniques from grounded theory as formulated by Corbin & Strauss (2008). For example the analysis will use *open coding and axial coding* ensuring a rigorous movement from the data to an explanation. Software for dealing with qualitative data will be used to support this process.

# 6. Plan for collecting data

The following table provides a tentative plan of how I expect to collect data. As the table shows the research will use an already conducted assessment of IT PPM in the four organizations. These data were collected with a different purpose, but may provide a solid foundation for making a pilot test of the theoretical framework of the research and clarifying the roles of the two embedded units of analysis in the case organizations.  When the pilot case study is finished and the theoretical framework has been altered accordingly, the data collection will start.

| Purpose of data collection? | What data will be collected? | Where will the data be collected? | When will the data be collected? |
|---|---|---|---|
| To facilitate a refinement of the data collection plans a pilot case study will be conducted. | The data from assessments of the IT PPM in the four organizations already conducted.  These data were collected by the DISIMIT-project. | The data is accessible from a server at the university campus. | The data was collected in spring 2010 |
| To provide data about *how* the organizations use *modes* | Documents describing the processes | In the central department of the four case organizations | Spring 2011 |

| | | | |
|---|---|---|---|
| *of control* in IT PPM | Interview with the senior manager responsible for the portfolio of IT projects. | In the central departments of the four case organizations | Spring 2011 |
| | Interview with the CIO | In the IT department of the four case organizations | Spring 2011 |
| | Interview with a chairman/project manager of a local project | In the local business units of the four case organizations | Spring 2011 |
| To provide data about *why* the organizations use the particular *modes of control.* | Interviews (A lot of the data from the first interviews can be used, but when the technique of the theoretical sampling (Corbin & Strauss, 2008) is used, it will probably be necessary to collect more data to develop the explanation. | Where it is necessary! | Summer 2011 |

**Table 6.1: Plan of data collection**

# 7. Expected findings

- The empirical data (how and why are *modes of control* used in Danish local governments.)

- Maybe a modification of the existing theory. This could for example be the notion in control theory that organizations prefer formal *modes of control*. It is possible that the local governments prefer informal *modes of control*

# 8. Literature

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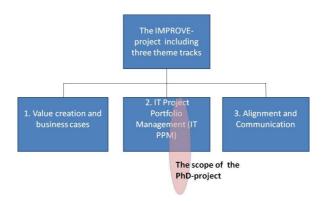Sinha, K.K. 2005, "Designing work within and between organizations", *Organization Science,* vol. 16, no. 4, pp. 389.

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# 9. Appendix A

The present PhD-project is part of an action research project aiming at bringing Danish local governments (municipalities) at the forefront of digital service integration through effective management of IT. The project is named DISIMIT and the project has a total budget of approx. $2 million.

The DISIMIT -project period runs from January 2009 to July 2012 and involves 11 Danish local governments represented by their IT Managers, two consultancy companies and more than 15 researchers from Aalborg University. To ensure relevance for the participating practitioners and grounding in real life problems, in the spring of 2009 the DISIMIT- project conducted a qualitative investigation to capture the most important challenges faced by the participating local governments. The investigation was composed of 35 interviews of CIOs, CEOs and Business managers from the eleven participating local governments, the data was rigorously coded using the method from Grounded Theory (Cobin & Strauss, 1996) and three major challenges were detected. Each of the three major challenges became the topic of a theme track in the DISIMIT -project. The present PhD-project is attached to the theme track dealing with IT project portfolio management (IT PPM). Figure 1 illustrates the scope of the PhD-project focusing on a selected number of IT PMM concepts which the theme track is dealing with

The IT PPM theme track involves six local governments who are represented by the CIO and/or IS manager, a consultant from each of the two consultancies, and three researchers. The six local governments are shown in table 1.

The theme track facilitates a range of workshops and activities dealing with IT PPM topics which are of interest from both a practical as well as an academic point of view.