"Only by delivering better designed products more cheaply, quickly and predictably will the image of the [construction] industry improve"

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Abstract

The society are changing, new products of technology are developed and the infrastructure is improved, e.g. are small hospitals are merged to large hospital. All of these initiatives is realized with a idea that becomes a project and after a number of processes is becomes part of our daily life.

This thesis will evaluate on what happens behind the scene in the development from a flux idea to the realization. In particular, this thesis apply two project management theories and apply this together with an in-depth case study of the Banedanmark project ‘The new rail Copenhagen-Ringsted’ a high-speed train connection and the first step of connecting Copenhagen to the coming Fehmarn tunnel.

This project is applying to one of the two selected project management approach, the Reference Class Forecast, and is the basis for a critical case about project management. The thesis apply to the Karl Von Poppel methodology of Black Swans and will be based on the case story collecting episodes, which exemplify black swans in regard to the what the project management theories and also what the planners was expecting in the idea phase compared to what was realized in the program and design phase.

The thesis will show that both project management has limitations and potentials regarding the applied case. Also the case will show to have its own understanding of dilemmas to project management and therefore a third project management approach to offer. These three in combination will show that planning is important in particular in projects when the construction owner is not the executor. Meanwhile a focus on knowledge and continuous learning is also important, which was an eye opener for the ‘The new Rail Copenhagen – Ringsted’ project

1. Introduction

This thesis touches upon the role of the project manager. Both on a theoretical and practical level this thesis purposed to discuss this field in particular directed the construction industry. The thesis will bring in two very different theoretical perspectives. These has contradicting opinions about the
role of project management in a construction project. To bring a critical perspective to the two perspectives a case story will contribute with a third proposal. The case story is a large Danish infrastructure project at Banedanmark – The New Rail Copenhagen – Ringsted. This is a 10 mia. Railway, purposed to connect the Danish railway network to Germany when the Fehmarn tunnel is constructed. The two project management theories is on the one side Flyvbjergs Reference Class Forecast and on the other side the Scandinavian approach represented by Kreiner and Christensen.

Project management is in general achieving increasing focus these days. Today organizations move away from traditional firm-based models of activity. Instead, they associate with the project-oriented organizations. Project-oriented organizations increases the flexibility and makes room for innovation, newness and change (Weyer, 2011). Thus, projects are widely used in order to effect change and to translate high-level strategic initiatives into day-to-day activities (Kreiner, 1992; Pelligrinelli, 1997). When the purpose is to achieve change, it becomes important to state a goal for what change you will achieve and what is should cost. Also called cost benefits analysis. Cost benefit analysis require forecasts of how the project will look like when it is finished (Flyvbjerg, 2003). However forecasting in the construction sector is challenging in relation to cost calculation. Therefore, the project management schools of thought have directed this field increasing attention. The two schools of thought do have a differentiating opinion about what is causing this tendency in the industry, including what the best solution is.

In the construction industry, more often than not, planners and promoters are not right in their forecasts, not only by a few percent, but also by several factors (Flyvbjerg, 2003, p. 37–41). Bent Flyvbjerg shows in his PhD from 2007 that the inaccuracy of cost estimates for transportation infrastructure projects are on average are 44,7 % for rails, 33,8 % for bridges and tunnels, and 20 % for roads. Meanwhile the inaccuracy for rail passenger forecasts was found to be 51,4 %, with 84 % of all rail projects being wrong by more than +20 %, this is equivalent to an average overestimate for rail passenger forecasts of 106 % (Flyvbjerg, 2007). Examples like this have resulted in national initiatives, which shall improve forecasting of large infrastructure projects.

<table>
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<th></th>
<th>Inaccuracy of cost overrun</th>
<th>Inaccuracy for rail passenger</th>
<th>Percent of projects being wrong about passenger forecasts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail</td>
<td>33,8 %</td>
<td>51,4 %</td>
<td>84 %</td>
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Errors in forecasting is a problem because it translates into misallocation of resources that can impact shareholders’ return on investment (Copeland, 1994) and affect customers’ (citizens of Denmark) perception of quality (Oliva, 2001; Oliva and Sterman, 2001) and also investments with money that could have been speed more wisely.

Therefore, the Danish government did in 2006 agree upon a new construction budgeting approach, which should improve the quality of forecasts. This approach has been used in the case project of this thesis: the new rail Copenhagen – Ringsted. Bent Flyvbjerg Reference Class Forecast inspirers this approach. Which is one of the two discussed project management theories in this thesis. I therefore find it interesting to analyze of how this forecasting approach is succeeding. As you will understand in the coming theory discussion, the two approaches has a very different opinion about project management. It should therefore be evidential for my reader, after the theory discussion that this national project management decision has its limitation, potentials and challenges, as pointed by the opposition theory.

Because the Reference Class Forecast has received such theoretical critique, it becomes important to discover its limitations and usefulness, through use of a case project that has applied it. It becomes increasingly important partly because the approach has become the preferred national approach, and partly because the theory is still very new and therefore not has been applied very much in practice. Therefore, its effect in practice is not yet very clear.

Before presenting my research question, I will present a theory discussion. This shall open up the discussion between the two project management theories, which lead to the key question of this thesis. After the theory discussion, I will be further be problematizing the theoretical dilemma including the practical dilemma regarding the use of Reference Class Forecast.

1.1. Theory Discussion
The following theory discussion will first present the two project management approaches. Thereafter I will compare the two approaches based on methodological differences and assumptions. The first theory presented is the Reference Class Forecast. The preferred approach in the ‘Copenhagen –
Ringsted is this theory. The Second and last theory is the Scandinavian approach. This theory creates an alternative and a quite new perspective to project management.

The two approaches represent two individual schools of thought within the field of project management

The Reference Class Forecast is based on a philosophy to project management, that is very good presented by Williams (2005) argues: “Project management as set out in this work is presented as a set of procedures that are self-evidently correct: Following these procedures will produce effectively managed projects, project failure is indicative of inadequate attention to the project management procedures”

On the other side is the Scandinavian approach that in line with Andersen (2006a) writes about project management theory “The more serious weakness may be the belief in total rationality and the assumption that the project task is clearly defined and unambiguous.” (p.17).

1.1.1. Reference Class Forecast

Flyvbjerg in association with Cowi (2004) developed the Reference Class Forecast to secure accurate data for the forecasters - in particular the forecasts for large infrastructure projects. This approach recommends the planners to only plan (forecast) based on a reference class of previously completed similar projects. Flyvbjerg and Cowi (UK Department for Transport, 2004) are describing the first documented instance of reference class forecasting for large transportation infrastructure projects. The researchers were as recommended by the HM Treasury asked to identify empirically based numbers to account for optimism bias in relation to specific transportation projects. The researchers were further asked to consult with the aim to produce realistic capital expenditure plans using reference class forecasting (Weyer, 2011)

Reference class forecast argues that complexity, uncertainty, and ambiguity witnessed in practice should have, and could have been, taken into account in the planning of the project (Flyvbjerg, 2003). In the planning process, the Reference class forecast cuts inaccuracy by bypassing the human biases and cutting directly to empirical outcome (Flyvbjerg, 2006 p. 12).

Human bias is bypassed in three steeps during planning:
The first step is different from traditional project planning because forecasters are not required to make scenarios, imagine events, or measure their own and others’ levels of ability and control. Instead they should identify the relevant reference class of past, similar projects. The applied definition of similar projects is wider than usually assumed, due to research that showed similarities of risk and cost overruns within distinct categories of transport projects. It is however required that the class of reference should be broad enough to be statistically meaningful, but narrow enough to be truly comparable with the specific project. The theory does not give further instructions and definition of how narrow and how broad the information load must be to cover the requirements to make it statistically valid.

“The second step is establishing a probability distribution for the selected reference class. This requires access to credible, empirical data for a sufficient number of projects within the reference class to make statistically meaningful conclusions” (flyvbjerg, Cowi, 2004, p. 12).

Finally the project forecaster should compare the specific project with the reference class distribution. Based on this they establish the most likely outcome for the specific project and decide on the acceptable percentage change of risk, for cost overrun and how much uplift they would use.
1.1.2. The Scandinavian Approach

Kreiner (1995): The project needs to co-evolve with a drifting environment – and not to be kept isolated on the ‘island’

In contrast to the statistical and logical Reference Class forecast the Scandinavian approach, oppose the logical structure of the phases. Thus, it connects to an extensive critique of rationalistic decision-making (March and Simon, 1958; Cyert and March, 1963) where bounded rationality and satisfying behavior are more appropriate characteristics of organizational decision making than rational optimization during the process. In the planning phase, the plans should reflect the vision instead of trying to make realistic interpretations of a future to come. Because evidently we do not know the future, so therefore there is no effort worth trying. The project manager shall instead introduce the project with open-ended plans. These shall be a vision instead of a goal and imply symbols for actions rather than descriptions of activities.

The Scandinavian approach transform the plan into a communicative device instead of a detailed road map. The purpose is to help and not control the project manager. The project manager’s task is to bridge the one side some desired future state, which can guide current, contingent action, and the other focusing on the conscious design and planning of social action to enable efficient, collaborative achievements. In practice, project managers face a dilemma in having to encourage both behavioral flexibility (adaptability) and behavioral rigidity (discipline). Secondly, project managers face conditions of complexity, uncertainty, and ambiguity. Conventionally, such conditions are made to signal poor project management, but they are often managerial premises rather than problematic outcomes. (Hällgren, Jacobsson, Söderholm, 2012).
The process is therefore:

1. First to define a vision rather than a goal that motivates rather than restricts peoples’ activities. It motivates since the idea that the “sky is the limit” does not rely on experience to define what is possible, as the case would be where the goal is set at the beginning.

2. Second, the result of the project is open until the results are known (practice), which allows for a definition of success based not on previous experience but on what the situation has allowed for, thereby reducing the “ok, but what could have been achieved?” (Hällgren, Jacobsson, Söderholm, 2012).

The theory says that the motivation for learning and innovation becomes an important factor. The authors leave the reader with ten pieces of advice for project managers. These are (Christensen and Kreiner, 1991 p. 107-14).

- Establish the vision of the project, which is tangible while still allowing for different solutions.
- Do not disparage the project team members’ realities by authorizing an agreement of one common reality for the project.
- Continuously adjust the goal by the situation.
- Use the project plans strategically in order to get a feeling for the project’s performance.
- Make unreasonable demands, be self-confident but be fair if you have to discipline someone.
• Be accessible, but not at someone’s disposal.
• Do not fear “chaos”, because it is a necessity for control and coordination.
• Share the successes of the project with the members – you will certainly be dependent on each other again!
• Define the boundaries of the project according to the situation.

These recommendations are opposite to Flyvbjerg who would not leave so much responsibility to the project team and would not keep the project open for the project the corrections of the managers during the project.

After presenting these recommendations, the authors of the Scandinavian approach say that project managers could or should not follow their advices in full. Instead they argue that their advice should serve as guidance towards an increased realization that an overly rational view of projects. Because this does not put enough emphasis on the existing uncertainty and the need for continuous learning in a project context (Christensen and Kreiner, 1991 p. 116; Hälgreen). Practically this means that the project manager needs to balance the tools and methods of project management against the project as a learning process, its situated features and its institutionalized deadlocks (Hällgren, Jacobsson, Söderholm, 2012)

Because project management is here seen as a process of learning instead of a test in rational decision. Uncertainty is viewed as an inevitable component of decision-making, and not something, which can be decreased through distributional information (Kreiner, 1995), such as The Reference Class Forecast recommend. Instead, uncertainty should be embraced (Kreiner, 1995), because uncertainty is not restricted to a particular phase of the project. Uncertainty cannot be eliminated through planning.

1.2.3 Comparison of the Two

I have now presented how the two project management approaches have two different opinions about how to manage a project. Their solutions is of course based on assumptions and definitions which result in their different views on both the role of the project manager, how he/she shall manage the project and what that should be left outside their job description and instead be left with the planners. I have selected three areas in the theories, which explain why they have contradiction recommendations to the project management. The three areas are also central differences, interesting for this
thesis is, because they show the effect of applying a Reference Class Forecast approach. This is relevant because it affects my research question of what I will look after in my case story.

The three areas, which I will apply in my theoretical discussion and later follow up in my analysis:

1. Whether projects are homogeneous
2. If optimism is a risk or a potential
3. If the project process should be linear

The model beloved shows how the two theories view differently on these three areas. This will now be presented and discussed.

<table>
<thead>
<tr>
<th>Scandinavian Approach</th>
<th>Reference Class Forecast</th>
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<tbody>
<tr>
<td>• Projects are unique</td>
<td>• Projects are homogeneous</td>
</tr>
<tr>
<td>• Optimism can be motivating</td>
<td>• Optimism can cause cust overrun</td>
</tr>
<tr>
<td>• Projects should be managed flexible</td>
<td>• Projects should be managed linear</td>
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1. **Whether projects are homogeneous**

The Reference Class Forecast defines projects as homogeneous, which is an effect of their recommendation of using reference projects. Meaning that they plan based on distributional information called taking an outside standing view. “argued that the prevalent tendency to underweight or ignore distributional information is perhaps the major source of error in forecasting (...) using such distributional information from other ventures similar to that being forecasted is called taking an outside view” (Fyvbjerg, ‘From Nobel Prize to project management: getting risks right’ 2006, p. 7-8). By recommending the use of distributional information, the Reference Class Forecast does assume the information convertible. It can only occur if projects are defined as homogenous, because otherwise the information could not be distributed to another project. Opposite to this, the Scandinavian approach argues that projects are unique (Kreiner, 1992), because they define project as self-referential (Weick, 1994)
In response Flyvbjerg defend the outside standing view and argues; “…the outside view, being based on historical precedent, may fail to predict extreme outcome: that is, those that lay outside all historical precedent. But for most projects, the outside view will produce more accurate results”. (Flyvbjerg, ‘From Nobel Prize to project management: getting risks right’ 2006, p. 9). Flyvbjerg accept the point of some uniqueness related to specific kinds of project, however he still argues that homogeneity exists.

To verify his argument, he used one example of a research project where the actors were supposed to conclude when the project would be finished. In this example, the curriculum expert made two forecasts for the same problem and arrived at very different answers. The first forecast was the inside view, the second was the outside view, or the reference class forecast. First was everyone from the team asked to write on a slip of paper the number of month needed to finish and report the project. The estimates ranged from 18 to 30 months.

One of the team members – a distinguished expert in curriculum development – was challenged by another team member to recall as many projects similar to theirs as possible and to think of these projects, as they were in a stage comparable to their project. The expert was asked “How long did it take them at that point to reach completion?” After a while he answered, with some discomfort, that not all the comparable teams he could think of did complete their task. About 40% of them eventually gave up. The expert could among the remaining not think of any that completed their task in less than seven years, nor of any that took more than 10.

The expert was then asked if it was likely that the present team was more skilled in curriculum development than the earlier ones had been. The expert said no, he did not see any relevant factor that distinguished this team favorably from the teams that he had been thinking about. His impression was that the present team was slightly below average in terms of resources and potential (Flyvbjerg, ‘From Nobel Prize to project management: getting risks right’, 2006 p. 9).

This example shows two things, first that the project was not as unique as the team did expect and they could have easier made the planning if they had used reference cases. This result challenge the Scandinavians argument regarding project uniqueness. This discussion is very central to understand the two different project management approaches, because the Scandinavian approach does believe in the uniqueness of projects and view the ide and program phase as challenged by less knowledge as the figure below illustrates.
1. **If optimism is a risk or a potential**

The second area for comparison is optimism. Flyvbjerg in association with Cowi (2004) argues, that human bias was the primary reason for cost overrun in past infrastructure projects. They put forward two kinds of human bias, which result in inaccurate forecasts. The first is optimism bias and the second is strategic misrepresentation. Optimism Bias is related to the human judgment, which is proved optimistic by Kanemann. Strategic Misrepresentation has been set forth by Wachs (1989, 1990) and Flyvbjerg et al. (2002, 2005). With this view on optimism the Reference Class does not give the project manager the decision making task and instead of letting the decision making depending on the knowledge of the project manager and the team – the decision was based on distributed information from reference projects (the outside view). The Scandinavians give the project manager the task of decision-making during the whole process, thus they also have another view on optimism. This is because their project manager’s role is to target a learning process, by focusing on the learning process they do also accept that the reference point is changing. By doing this they make room for individual decision taking activity that Flyvbjerg will view as a risk for optimism buyer. Optimism buyers cover what he call buyers of optimism and strategic misrepresentation. Both are they resolving in planning fallacy (fejlslutning) followed by cost overrun and overestimation of benefits.

Strategic misrepresentation occurs when forecasters and managers overestimate the benefits and underestimate the costs of the project to increase the likelihood of projects approval and funding. This
explanation is intentional, which optimism bias is not, but they are both explained by a human bias that affect the decision-making of people under process uncertainty. Though optimism bias is relatively often shown in situations where political and organizational pressures are absent or low, explanations in terms of strategic misrepresentation have their relative merit where political and organizational pressures are high “Where there is political pressure there is misrepresentation and lying…” (Flyvbjerg, 2006 p.9).

Strategic misrepresentation is a problem in political constellations, because they evaluate and more importantly, they give commission to the making of budgets and project forecasts. Thus, it is also the reason why they are motivated to misrepresent the information to achieve a specific result. Politics has a long history and is as described a battlefield of negotiation and getting influence on the decision. In the context of Reference Class Forecast, such lies are also described as strategic misrepresentation (Wachs, 1989 & 1990; Flyvbjerg 2002 & 2005). The term has been coined in order to describe an inaccuracy in planning which leads to the planning fallacy. When a misrepresentation of costs and benefits are made for political reasons this may be defined as a lie (Flyvbjerg, 2005). Strategic misrepresentation implies an intentional overestimation of project benefits or underestimation of cost related to the project. This deception of stakeholders happens when project managers and executives try to secure resources or to gain approval in favor of pursuing the particular project (Flyvbjerg, 2006). Project managers and other decision makers are bounded to be competing for the allocation of funds or for the approval of their project. For example, when several companies bid for a contract, cost estimates may deliberately be kept low in order to secure the contract. Strategic misrepresentation associated with the process of a project occurs when an individual or an entire organization is apt to, protect their particular interest, or hide potential failure. This explanation for mistakes in project planning has an increasingly high value considering the amount of competition in the political system (Flyvbjerg, 2003).

Even though Flyvbjerg differentiate between the presented strategic misrepresentation and optimism bias, it can be difficult to differentiate in practice. Because his definition to strategic misrepresentation as presented strategic misrepresentation occurs when the political pressure is high. Whether the pressure is high does depend on the individual definition. Further empirical research of strategic misrepresentation can be difficult. Because few people will admit that, they have used strategic misrepresentation and have denied this to them self. Maybe they remember their strategy of misrepresenting, but they just do not want other people to know about this. This methodological limitation is likely the
reason why Flyvbjerg has described the strategic misrepresentation with fewer words and examples, compared to optimism bias that have much more space in his articles. Nevertheless, strategic misrepresentation have the same importance in his argumentation.

Optimism bias drawn upon Kahneman and Tversky (1979) and their psychological research of explaining what they call ‘planning fallacy’ (planlægnings fejlslutning). Kahneman and Tversky did discover a cognitive bias related to decision-making under uncertainty. For achieving of research, they won Kahneman the 2002 Nobel Prize in economics (Kahneman, 1994; Kahneman & Tversky, 1979a). They was also the first to mention the relevance of using Reference Class Forecast. Flyvbjerg was however the first to apply it into project management. Here Flyvbjerg use Kahneman and Tvesky’s work that showed a, inconsistent human judgment. This they call optimism bias. The optimism bias (inconsistency in human judgment) shows that people are unable to make rational decisions. They cannot balance the potential profit or loss while including consideration of likelihood. Because a type of delusion causes them to be optimistic. Optimism bias is therefore not something done on purpose, but a inlying part of human, that makes us unable to think rational. In the context of project managers, they are subject to the planning fallacy are therefore in the dark of the potential to make mistakes. They feel that possible benefits far outweigh risks involved. The project plan does therefore have the task to manipulated natural human behavior (Flyvberg, 2003).

In a situation where the decision of the plan is made, but for some reason the status quo differ from expected status, the choices can induce more adventurous. This occurs if the decision maker has not adapted the status quo: e.g. if an entrepreneur has lost 2,000 and is facing a choice between a sure gain of 1,000 an even chance to win 2,000 or nothing. If he has not yet adapted to his losses, he is likely to code the reference point as a choice between 2,000 and 1,000 P. 286. They also found that in situations where the status quo is positive, the risk aversion will increase however, the potential bonus is the same. Based on these findings about reference point, they conclude that value (which the decision-maker shall forecast) should be treated as a function in two arguments: 1) the asset position that serves as a reference point, 2) and the magnitude of the change (positive/negative), and not only utility, which the Utility Theory argued. The magnitude of the change can be viewed differently, depending on the human perspective Kahneman and Tvesky (1979a; 1979b). The human judgment is generally optimistic due to overconfidence and insufficient regard to distributional information. Thus, people will underestimate the costs, completion times, and risks of planned actions, whereas they will overestimate the benefits of the same actions and the value function will change and errors
of judgment will occur. Later studies has aimed at exploring reasons for the occurrence of optimism bias. Observations has led to the hypothesis that comparative optimism exists due to the perceived lack of information others have when judging the likelihood of an event occurring. Thus, the design of the second study aimed at informing individuals about the factors others consider when estimating their chances. As a result of this information unrealistic optimism for positive events decreased at a noteworthy level. However, when considering negative events the hypothesis that people tend to hold an inaccurate image of others was confirmed. In conclusion, Weinstein (1980) found that individuals “believe that negative events are less likely to happen to them than to others, and they believe that positive events are more likely to happen to them than to others” (p. 807).

Opposite to the Reference Class Forecast, the Scandinavian approach gives attention to a people and behavior driven field. Here optimism is a driving force, which generates the needed adaptability to operate within drifting project environment. Until recently there was little empirical evidence to suggest a positive correlation between business success and a positive psychological disposition. However, increasingly research and theory building propose optimism to be leading to positive organizational behavior, such as overcoming challenge in the project management environment (Dolfi/Andrews, 2007). This is both an important and interesting point, because it is contradicting to Flyvbjergs view on optimism.

In response to this the Scandinavian authors and supporters describe optimism as an individual or collective ability of future perfect thinking, that is an ability to imagine what will have to be done in order for a project to be completed and based on this accomplishment to determine what has to be done in the present (Winch/Kreiner, 2009). Similarly, Seligman (1991) calls for a flexible or complex optimism when the future can be changed by positive thinking but not otherwise. To date there is a gap in the literature as it relates to the possible influence of dispositional optimism and its effects on an individual’s ability for future perfect thinking (Winch/Kreiner, 2009). Therefore, seen through the lens of Scandinavian project management theory, optimism is a positive capability for the project manager and the project team. This is important to secure project success, because it lead to a organizational behavior that can overcome the challenges, which they believe will occur in a project due to their definition of the environment to be drifting and therefore constantly changing. This statement gives more power to the project management, followed by the trust in their intuition to the potential and not just a risk for the project. However by this trust and increased influence on the project, the
role of the project management also increased, because with this definition is also become their task to absorb the changes, as this is what they are concluded to be able to.

1. If the project process should be linear

Now the two areas, optimism and homogeneity, is outlined. The next difference I have chosen to describe is the question of whether projects must be managed linear, or not. This is a very central part of the Scandinavian theory and therefore important to bring in. As for the Reference Class Forecast, the management approach is linear, because they assume that the forecasting will include the whole process (Flyvbjerg, 2007).

This project management model is a linear model, because there is no room for going back to the idea phase when first the project are in the design phase. This is because the reference class forecast, as presented is cutting directly to the output after the forecasting. The metaphor ‘cutting directly to output’ covers the idea of planning the whole process in the first phases and thereafter executing the goal. Evidently, the Scandinavian approach disagrees with this. Knowing that they argue environments to be drifting they does not find it suitable to manage a project with a linear approach. Instead, they argue that it is the linear approach and its focus on planning is that causes the problem of project failure. Before explaining their argument, I will state underscore that this is the Scandinavian alternative explanation to the same problem as The Reference Class Forecast explain by optimism bias. The two explanations are very different and they do almost disclose each other in a way so they is not possible to combine. Instead, the focus on one of the solutions can cause what the other solution is afraid of. It will therefore be interesting to see how the case is handling this and if they can contribute with operational supplement to the theory discussion

The Scandinavian approach claims that construction development is a wicked problem and should therefore not be planned in detail. Wicked problems was defined by Horst Rittel in 1960’er and is referring to evil problems. Situations where the problem is not precisely defined and the existing information is contradicting, many stakeholders and decision makers are involved and the effects of the initiatives are different from the expected (Churchman 1967). Based on this Kreiner (2011) compare this to the challenges within the construction sector and writes to Flyvbjerg and others of the rational project management school “there have to be a better way to plan this, so we can avoid the scandals”, we are thinking, while we a looking for such methods. But maybe is this not the approach, but the particular ambition to plan everything, which is an old fashion goal in a world, which is
dynamic and complex”. (Translated from Kreiner 2011 ‘Byggeriets Gengangere’ p. 1). He says that instead of planning everything, the project manager shall see the problem as a wicked problem - something which cannot be avoided and taken away through planning. Therefore the Scandinavian project manager focus on motivating the project team and managers to be less hierarchical structured as stated in the presentation of their project management approach. (Kreiner ‘In search of relevance: project management in drifting environments’, 1995 p. 342)

This section ends the theory discussion and the three selected themes (homogeneity, optimism and the project process), which approaches do disagree upon according to essential subjects within project management. This initiate a interesting theoretical discussion, which my case study can contribute to. Furthermore this does indicate the complexity of deciding the right project management approach, and the included risk of choosing the wrong approach. The national approach in construction projects are relying on the reference class forecast. This is according to the theory discussion, a decision which can be both a good and a bad choice.

### 1.2 Problematization

What drives this thesis is first an interest in innovation and project management of large-scale investment. Secondly, I see it as a paradox that the two discussed project management theories are contradicting on essential questions, however they both is directed the construction sector and touch upon the same fundamental questions of how project management is best done and why the sector experience the many examples of cost overrun. Thirdly, and because of the different opinion within project management theory, I find it necessary to discuss the consequence of using Reference Class Forecast as the preferred project management approach. It can be a problem for the national project management if the Scandinavian approach is right that projects are not homogeneous and planning from start to end is not possible. It can have a bad effect on the output because the project will not absorb the change of environment, which can cause change of goals. If not realizing such change the project can end up executing a project, which is not any longer relevant when it is ready for implementation. There have been examples of this in the public sector before. For example ‘rejsekortet’ the card which shall be used as train ticked to pay for your trip from A to B. this solutions as received critique of becoming irrelevant in the process from they did plan the product and until it was released. On the
other hand, the planning phase is an essential point in the Reference Class Forecast, as presented in the theory discussion. The second presented critique from the theory discussion was the optimism buyers where the Scandinavian approach has a view on people as a positive factor and their intuition will make the project survive instead on killing it with their buyers of optimism. In a time where resources are expensive and we try to improve the processes everywhere, it is important to be clearer about the people’s role in the project. If they shall be placed in the project only to process it or if they can add more value to the project through the process. The third discussed point was whether a project process shall be linear and this summarize the other problematized dilemmas, because this question touch them both. Because if the project is not best suited by being planned completely from the beginning it should and cannot be a linear process. Further if the project manager is left with the responsibility to open up the learning process there is a need to make the process less linear. This recommendation are similar to a newly introduced process model of technological innovation, the so-called chain-linked model (Kline & Rosenberg 1986). The key process is to create a design to be based on needs and demands. Although the process can be sequential, there are numerous feedback loops. When a problem arises, participants turn to existing scientific and technical knowledge to look for solutions. Only when this fails is new research needed.

The discussion between the two project management theories is therefore also a theoretical discussion of innovation management. This increases the importance and problematization of the theory discussion, because as mentioned the Reference Class Forecast is the preferred project management approach. Because the government is focusing on innovation, their project management approach
should therefore also reflect this strategy. However, it seems not to be a goal in the reference class forecast, the preferred approach. Therefore, it is interesting to view if innovation arises, however the project management approach does never mention it.

The purpose of this thesis is a discussion of the potential of adding innovation into the goal setting in public projects. This main research question of this thesis is therefore: how and to what extent is innovation a part of the project management in the Copenhagen Ringsted project.

This question is broken down into following sub-research questions:

- How and to what extend is forecasts and other plans used to execute and plan Banedanmarks ‘Copenhagen – Ringsted’
- How and to what extent is the Reference Class Forecast useful at Banedanmark for their planning and execution of ‘Copenhagen – Ringsted’ project.

The first sub-question will be described in the case presentation. This presents the idea and planning phase, followed by how it has influenced the execution of the process. The second sub-question has a analyzing purpose and will therefore be outlined in the analysis. This is essential for the discussion chapter, where the research question is discussed. This is placed in the discussion because it is a result of analytical finding is not possible to make a final answer about. Instead, a discussion that is a natural result of the analysis of the project management approach. It is interesting if this approach fit the national strategy of being more innovative to create more jobs and to improve the competitiveness in regard to other countries.

This current section rounds of part I about the background of this thesis. The theoretical discussion about a practical problem, which offers a research question, which outlines both a practical and theoretical discussion. In the Chapter 2 the methodology is presented, followed by Chapter 3 where the case story is presented. Thereafter chapter 4 outlines the analysis, which leads to chapter 5 and the discussion. Finally, this thesis is concluding on the research question in chapter 6.
1.3. Purpose

The purpose of this paper founded on the theoretical discussion and the dilemma regarding the project management approaches, this discussion outlines. The purpose of this thesis is to investigate the project management in a in depth case study in a selected project case. To outline episodes of examples that gives critique to the theories and answers to the discussion between these. Yet this will only the based on one single case and is not purposed to be generalized, but is instead a documentations of episodes which present the life of a project. Episodes, which potentially could replace the view on cost, benefit as the object we view on when forecasting a project, because who says that experience of episodes and the process of execution could not be as much valuable as knowledge about the result according to cost and benefits. Maybe it should be a combination, this the case story hopefully shows the value of a cost benefit forecast and episodes that might be a valuable reference case for future projects.

2. Methodology

The purpose of the methodology to secure the validity of data selection, and collection which contributes to an answering the research question of this thesis. The method is chosen, because it makes the best basis for answering the research question. The case presentation is presented with headlines of the linear project management model, because this is the structure that the organization is using.

The data applied is applied as a critical case study, I will present the rationality after a short introduction to the general advantages of a case study and why this offer value to my research question. This is followed by a presentation of the characteristics of a critical case study. Thereafter I will present the method for data collection and finally make a presentation of how I relate to my role as a researcher.

2.1. In Depth Case Study

The first time I recognized the value of a case study, was when I experienced how my student job added a new perspective to my school readings. The learning achievement came from listening to my colleagues who have many years of experience. My learning curve jumped many steps, and I literally
gained knowledge through combining my academic knowledge with achieved practical experience from project management. The value of case study before showed ability to generate new knowledge and theories. For example by Frederick Taylors, when he invented the scientific management and changed the management literature and practice into a new era. I figured that if managers and authors have been able to produce new knowledge and theories through case studies, this must also be possible for my thesis.

The definition of case study is “the methodological purpose of case study is best defined as an in-depth study of a single unit for the purpose of understanding a larger class of (similar) units” (Gerring, 2004: 342). A unit Gerring defines as a phenomenon – observed at a single point in time or over some delimited period. The period presented in the case study is the time around the forecasting and other planning and times processing of the project. These single units (the case) exemplify the execution of a forecasting and its role with the project organization. This can improve the understanding and inspirer other similar cases. The goal of the case study is therefore to open up new perspectives on old thinking and take advantage of the closeness to real-life situations and its multiple wealth of details (Flyvbjerg 2004). This will be done with inspiration from (Hans Eysenck, 1979 p. 9), who says that 'sometimes we simply have to keep our eyes open and look carefully at individual cases – not in the hope of proving something, but because concrete experience can be achieved via continued proximity to the studied reality and via feedback from those under study'. This focus shall offer my theory building an inside view in organizational routines, which only enemata from experience (Gittel, 2002; Zollo and Winther, 2002). This is possible because case study focus on context-independent knowledge, relying on practical experience and turn away from exclusive focus on context-dependent knowledge and rules (note). “Context-independent knowledge is the factor which allows people to develop from rule based beginners to virtuoso experts and secondly, in the study of human affairs there appears to exist only context-dependent knowledge”. (Flyvbjerg ‘Five misunderstandings about case study’ 2006, p. 6).

About this approach Mintzberg said “if the practice is hidden and considered irrelevant because it goes against rational behavior and task execution, with only context independent knowledge we become ill-equipped for the reality when the tools and models only are a part of what they are supposed to do” (2004) in his book on the shortcomings of MBA programs. The case study appears to be the perfect way to investigate my research question, because this thesis will test the Reference Class Forecast concerning one single unit (case). Alternatively, I could make my research ‘carried out in
some numbers’ (Flyvbjerg, 2006), but my research question would not take advantage of this approach. A large questionnaire would not have offered me knowledge about surprising episodes eventually occurring after the forecasting and changes its direction. Furthermore the norms according to design and the culture in the organization, which might affect the forecast, is not possible to experience through a questionnaire either.

2.2. Case Selection

The final argument for doing a case study, became clear to me when I read that the ‘new rail Copenhagen – Ringsted’ is inspired by the reference class forecast which enables me to discover the use of reference class forecasting in practice. This creates an inside view in where the approach is contributing with positive aspects to practice and where it has limitations. Also it will give me an idea of what the project team use the forecasts for and if the forecast has improved and maybe changed character during the project. I will therefore look for episodes where the forecast was useful and when it did change character and how the team uses developing supplementing theory if the Reference Class Forecast is not enough.

The case is increasingly interesting, because it is the first railroad project in Denmark, enabling trains driving with a speed of 250 km/h, and it will end up connecting Copenhagen to the Fehmarn tunnel, therefore it is already an innovative project in Denmark. It is also a mega project according to Flyvbjergs definition of such: “Megaprojects (sometimes also spelled "mega projects") are very large investment projects. The US Federal Highway Administration defines megaprojects as major infrastructure projects that cost more than US$1 billion, or projects of a significant cost that attract a high level of public attention or political interest because of substantial direct and indirect impacts on the community, environment, and budgets.” (http://flyvbjerg.plan.aau.dk/whatisamegaproject.php). This makes the project more complex regarding risks and financial support in the parliament. In addition, it improves my research that the project has similar characteristics as the projects that Flyvbjerg has used for his research. When I view on the same kind of project, I should be more likely to come up with the same results as Flyvbjerg did. Conversely, I have added another project management approach to my theoretical analyzing toolbox and therefore I will probably view the case with different eyes than Flyvbjerg did, when he developed the Reference Class Forecast.
This case is suitable for my research question partly because of the above mention reason, but also because it gives material for a small-scale case study. Christensen and Kreiner have discussed the two levels of studies, and made the following definition: “There is the micro situation – for example, the reputation of the project manager allowing for more or less flexibility (…) There is the macro situation – for example, how projects is done at a company and what the clients in a specific industry expect from a project”. (Kreiner ‘In search of Relevance: project management in Drifting Environments” Scandinavian Journal of Management, Vol 11., No. 4 pp- 340, 1995) In this definition, the reputation can only be discovered in a micro study because it requires personal experience over statistical large-scale research. Similarly, for this thesis it would not be valuable to make a statistical large-scale macro study. Would not tell how forecast is applied in practice. In order to show this I must turn to the practice and talk to the people how are working with this. I need there examples and presentations of episodes to understand how the forecast is used and executed. If I had chosen a macro level case study, I could not make a critical view of practice. Statistical sampling of on when the forecast is succeeding and failing is to my opinion not possible or at least not enough to cover the purpose of this thesis.

2.3. Critical Case

Small case studies have been criticized for missing validity, however this I respond to, by applying my study as a critical case study. The critical case generates theory, based on falsifying existing theory and through this new ideas rise in the gap. Leaved after new perspectives have replaced areas in old thinking. In the critical case the falsification is made with the metaphor of the black swan ‘If it is valid for this case, it is valid for all (or many). The metaphor for this approach is if one swan is black, all swans are not white’ (Flyvbjerg:’Five misunderstandings about case study’ 2006, p. 5). This form of theory making is developed by Karl Popper and is called falsification¹, and forms a critical reflexivity

¹ Falsifiability or refutability is the trait of a statement, hypothesis, or theory whereby it could be shown to be false if some conceivable observation were true. In this sense, falsify is synonymous with nullify, meaning not ”to commit fraud” but ”show to be false”.

By the problem of induction, no number of confirming observations can verify a universal generalization, such as All swans are white, yet it is logically possible to falsify it by observing a single black swan. Thus, the term falsifiability is
"All swans are white," In its negative form, the falsification would be, ‘If it is not valid for this case, then it is not valid for any (or only few) cases. The black swan are then used as a metaphor for the thing that does not fit, things which usually appears to be white, but after further investigations turned out to be black.

Examples of recent Black Swan events are 9/11, the success of Google and the current global financial crisis. Many people would say that non or all of these examples could have been predicted, but even if some people did foresee these events then no significant mitigating actions were taken or their impact would not have been so great (http://www.de-risk.com/blog/article/avoiding-black-swans-12). In other words a Black Swan event is not expected. Therefore, a black swan can also be related to an unexpected thing which occurs on operational level and therefore in one particular case eliminates the purpose of the point in the literature. A black swan in this thesis is then a episode or a managerial initiative, in the case story, which conflict with the Reference Class Forecast or the Scandinavian approach.

The Black Swan methodology one of the most rigorous tests to which a scientific proposition can be subjected, because if just one observation does not fit with the proposition it is considered not valid.

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sometimes synonym to testability. Some statements, such as *It will be raining here in one million years*, are falsifiable in principle, but not in practice
The findings must therefore be either revised or rejected, it enables me to conclude a general significance against the theoretical proposition and stimulate further investigation and theory-building. (Poppel 1934(1980: 59). Therefore I am aware that my conclusion should not be generalized as the norm for project management, but instead a critical view on the theory based on episodes and experience from one case.

The critical case is a perfect way to deduct the logic of existing theory, because it is critically looking for episodes arguments, which are contradicting with the theoretical arguments (black swans). In this context it is important to notice that a black swan for the reference class forecast can be a white swan for the alternative approaches. However this is not a problem for the research question, because the goal is not to critique of the Reference Class Forecast neither the Scandinavian approach alternatives. The focus will be to find black swans which showed up after the forecast and disqualify the targets the forecast included.

2.4. Data Collection

I, as a researcher are aware of my methodology in my data collection. But what I as all other good craftsmen, I as a researcher can do is to use my experience and intuition to assess whether I believe a given case is interesting in a paradigmatic context and whether it can provide collectively acceptable reasons for the choice of case (Flyvbjerg, 2006).

I have developed a research question that can help to structure and control the work with this thesis and its content, as presented in the previous chapter.

Insights for my research will derive primarily from an intensive case study research. The data of collection is a combination of interviews and background material. The background material is partly collected from Banedanmarks official homepage and partly delivered by Banedanmark.
To improve the value of the background material, the respondents in the interviews have also been used to clarify questions about the data or secure that I have understood the technical parts correctly. The background data has also been used to clarify the forecasting phase and the decisions made. This has been necessary given the timing of my study, since I was unable to conduct observations in the idea and planning phase, because this was finished before the work of this project.

The interview data was collected through five semi-structured, 45- to 90-minute interviews conducted with the 3 persons with central position in the project. I did make 2 interviews with the CAD Manager, 2 interviews with the Financial Manager and 1 interview with the Project Director. The intention of the interviews was to understand the respondent role in the forecasting process, their perception of the process, and to explore explicitly the unintentional biases due to blind spots as well as the political agendas of the different actors and functional areas. To assess the bias elements of the forecasting process I explicitly asked respondents about their incentives and goals. I then triangulated their responses with answers from other actors. The interviews have been conducted in Danish to secure that the interviewed person understood my questions. This decision was made per request from the first interviewee. Thereafter I decided to continue with Danish interviews, both for the sake of the interviewee, but also because I wanted to be sure, that I had correctly understood the sometimes complicated, technical terms and explanations. Therefore, the interviews quotes, which are presented in the case story, is a translation of the Danish interview quote. In the translation process there is a risk of
small meaning changes. This I have been aware of and therefore the interviewed persons have had the chance the read the translation. Furthermore the interview are enclosed to this thesis and therefore the reader can read the full interview if he/she is able to understand Danish. I figured the small methodological effect of my translating the interviews was better than misunderstandings during the interview.

The interviewees were chosen for their individual expert knowledge the CAD manager, the financial manager and the Project Director. CAD stands for Computer-aided design, and the CAD manager is responsible for documentation of technical design. CAD is a function to improve productivity and interchange of CAD documents between different sub projects and CAD programs, especially in architecture and engineering disciplines (the CAD manager interview 2). The CAD manager was selected as interview person because she is responsible for the knowledge and overview of the data design. This I expected to be an area, where the innovative outcomes could be monitored. As supplement to her knowledge, the financial manager has been useful in explaining the effect of the CAD managers’ work according to economical terms, because he was monitoring the costs responding to the design ideas. The CAD manager is architect and has a background in Rambøll. The financial manager is coming from a private consulting company. The financial manager did consultant work with the development of the new budget approach for governmental infrastructure projects. Therefore he has also been a source explaining this budget approach, which adopts to the national project management philosophy and includes Reference Class Forecast inspirations. However, this is not related to his position at Banedanmark it was interesting to hear his opinion about the model in retro perspective. Finally the project Director is contributing with most knowledge about the idea and planning phase, therefore he his commenting on the background material about this. Except from this he is not used very much in the case presentation, because I preferred to make space for the two other interview persons who have a hands on knowledge about the design and the financial work activities. The Project Director is used again in the analysis where he is commenting on the episodes, which is selected. To not affect his answers I did not present the episodes for him, but did instead make talk more in general. This did result in a very interesting interview with new perspectives that gave me a third alternative. Supplementing the two presented project management theories. Therefore in the analysis the case story and the commends from the Project Director does present a theory. A theory in its form of being context-dependent and only based on this single case and the knowledge of the Project Director.
In order not to affect the reporter’s point of view, I will be very aware of my role as a researcher. I will be aware of the limited division between me as the researcher and the subject (the respondent). The researcher will always be embedded in a perspective of understanding and from this perspective be interpreting the research subject, why there can be many realities and many interpretations, as constructivism and social constructivism believe that objects do not have essence. It is humans that give the objects meaning and therefore social constructivism is anti-essentialism (Kvale, 1996)

As a foundation for self-criticism, I am using Kvale’s theory about interviews to clarify the pitfalls and limitations that lie in our empirical work and the way I have chosen to approach it. I am aware of the relevance of validity. I were aware of asking questions that was objective enough and could generate value in relation to my research question.

The following chapter presents the case story. I will tell the story with all its diversity and leave scope to the readers own conclusions, I will also allow the story to unfold from the many-sided, complex and sometimes conflicting stories which is be required to find all black swans. The perspectives, noticed and applied, are the interview persons and the general background material made in Trafik Styrelsen. First project limits will be described and thereafter the governmental structure. Thereafter, the case story chronology is summarized, followed by a more detailed presentation of the case story. The case story will be presented with the same headlines as a linear project management process. I have chosen this because this approach is the management approach for this project.

The two first phases was controlled and executed by Trafik Styrelsen and Banedanmark executes the three next phases. The Design phase will have the main priority in the case presentation, but also the idea and planning phase is important, because these phases state the limitations and goals stated in the introduction regarding the role of forecasting.

The linear project structure is purposed to offer the reader to experience the project as the project has been decided structured. This is supposed to asses it clearer if a linear process meet challenges
and if black swans occur. The linear approach will be discussed in the discussion and compared to alternative development approaches therefore this structure of the case story is increasing the readers understanding of how this project is linear and enable them to see if the project must to be managed not linear due to external reasons such as not expected episodes.

3. Case Story

3.1. A New Rail Copenhagen - Ringsted

The new rail ‘Copenhagen – Ringsted’ is a project, initiated by the government in 2003. It is owned by Trafik Styrelsen and processed by Banedanmark. The budget is today DKK 10.4 billion and the line is due to open in 2018 (http://uk.bane.dk/visBanearbejde_eng.asp?artikelID=15469). The line is designed to speeds of up to 250 km/h. Denmark's first railway for high speed trains. This will offer a better timetable with more departures, shorter travel times and fewer delays. The project includes 60 km dual track railway, electrification of the new line, Platforms at Ny Ellebjerg St, an additional track at Køge St., track renovation at Ringsted St., a new station (Køge Nord) and a connection to Lille Syd (http://uk.bane.dk/visBanearbejde_eng.asp?artikelID=15469).

Above is a French railway for high speed trains.

Photo: RFF/Photolabservices

The new track will result in a significantly improved timetable with more departures, shorter travel time and fewer delays. The new Køge Nord Station will create a central hub that allows transfers to and from the S-train system. The Project organization is in the process of building the new railway between Copenhagen and Ringsted via Køge. The rail replace the existing rail between Copenhagen and Ringsted via Roskilde, one of the most used and important rail lines in Denmark today. Used by
peddles between Copenhagen and the cities around on Zealand, Danish and international passengers-traffic and cargo traffic. It is one of Denmark's busiest and most important routes.

Below is presented the “Project chronology” providing a chronological overview of the project events. The events will be further presented in this case story and thereafter a selection of episodes will continue to the analysis.

- 1993 the idea of a railway Copenhagen – Ringsted was introduced
- 2003 the government agreed to finance the ‘Copenhagen – Ringsted’ project, with a service through Køge instead of Roskilde
- 2006 Danish Transport Authority agreed on the new construction budget approach
- Jan. 2009 the rail track direction was changed and the budget became 10, 4 billion
- In 2009, also the design strategy was decided based on rules and norms for railroad construction. The railway could turn from the planning phase to the design phase.
- 2010 Banedanmark took over the project, a new double-tracked, electric high-speed railway from Copenhagen through Køge to Ringsted.
- Banedanmark experienced difficulties reading the design documents and started to develop a management approach for this. Causing that they challenged the design strategy.
- Banedanmark decided to develop a CAD solution to improve the design planning and knowledge management.

3.2. Organizational Structure

The organizational structure is evidently affecting the project management approach. The project management approach is influenced and limited by the project being state owned, because they are constructing for the states funds and not their own. Therefore they have what in Danish is called Anlægslov. This is a law of how the construction design should be and the budget of the project “The moment the construction law is made, the project is decided” (Project Director, Interview 1).

In the Construction law Trafik Styrelsen has defined design requirements and guidelines about basic geometric parameters and common look and material (baggrundsmateriale, design strategy). The
process is controlled by a set of guidelines concerning placements of the constructions, the construction angles and principles for bridges, construction security, walls and distances to other buildings and constructions (‘Bagrundsmateriale design strategy’ p. 10). However, there is room for adjusting the design based on the different local environmental conditions. This enables elements to be replaced with elements of different qualities and opportunities. These elements could for example be cheaper material and improved quality of the design in several cases (CAD Manager interview 1). Known solutions therefore dominate and only selected areas must be given special architectural and scenic beauty developments and identities. The design strategies concentrate upon the fundament of primarily the building and areas along the rail, which are visible and impressionable and have the biggest effect and benefit. For example, the design of a noise protection is designed to visually please the passengers and neighbors. It is a very transparent protection shield, and this do please both special need for visual contact for example near bridges and areas around stations (‘baggrund material design strategi’).

“There are generic requirements, norms and standards that is required for all railroad project. This means something that is not stated for this specific case. This is for example the design of the rail. Then there is design for that is depending on the project for example if it should be a double track the speed and so on – these individual design plans are stated in the construction law” (Project Director Interview 1)

“There are different approaches in Europe, not all countries has a construction law as we have here in Denmark” (Project Director Interview 1)

To build the railway is stated a budget of 10 billion. The new rail Copenhagen – Ringsted’ is applying to the new budget law for construction project made in 2006. A budgeting approach which is inspired by Bent Flyvbjerg, who advocates for a rational approach through his recommendation of the theoretical model ‘Reference class forecast. “A central element in the new construction budgeting is carrying through a quality control of the decision making (...) Therefore the model is particularly focused on documenting the decisions through all stages of the project” (‘trafik styrelsen, den nye anlægs budgetterings form’ p. 30). This model was made as an outcome of an analysis of a selection of infrastructure projects including railroads. The analysis showed a number of projects with budgets overruns of 10 pct in comparison to the original estimates. The new budget model was
thereafter decided to cover this problem with a new approach to budgeting, control and follow up upon the processing of large construction projects. These principles was first applied in Transport Ministeriet, and did therefore include ‘The new rail Copenhagen – Ringsted’ project. This approach is, according to Hakon Iversen head of department in Danish Transport Autority, inspired by Bent Flyvbjerg’s Reference Class Forecast model. Inspired by Flyvbjerg they take a approach to project management, which manipulate the actors to decrease the optimism.

The new construction budget law did include three new tools for the budgeting process inspired by common initiatives in England, Norway and Professor Bent Flyvbjergs investigation of budget overrun among mega projects (http://www.fm.dk/publikationer/2010/1969_professionalisering-af-arbejdet-med-it_projekter-i-statens/bilag-6-erfaringer-fra-infrastruromraadet/)

- External review
- Expirience based corrections supplements
- External review according to risks, based on reference projects.

The new budget principles focus on distributed information of prices and quantities. These will typically be collected in a database by the construction authority. When experienced prices are not present is used catalogue prices and estimates. The approach does not work with general uncertainty within the construction budget, because this is handled through experience based correction supplements. Besides this approach it requires that continuous changes of the budget assumption can be traced later in the process. Experience with the new approach is still limited, due to the short time period since the introduction and the project with the applied approach is still in process. However, about this model, the director of FRI\(^2\) Henrik Garver, has expressed that because none of the participants in construction projects likes budget overrun “the elements of the model sounds as interesting initiatives, potential to improve the budgets in a direction of better and more precise - It is initiative he will follow with positive interest”. However he state that, it is impossible to answer if the new model will result in improved budgets, although it has a inborn potential for success, thinks Hakon Iversen; "The collection of project experience data, which the model depends on, will and hopefully enable that we continuing improve the budgets of large infrastructure projects.” (both quotes from following article http://ing.dk/artikel/regeringen-slut-med-hovsa-regninger-pa-baner-og-veje-97217)

\(^2\) foreningen af rådgivende ingeniører
The decisions surrounding a budget of a state owned infrastructure project consist of two levels, the first decision is made upon project description of a rough estimation of construction costs, with the stated conditions and potential layout solutions. Also an evaluation of risks and uncertainties and a description of the organization as yet and a description of societal reason for the construction were made presented as “the best realistic estimate out of the available knowledge” (‘Ny Budgetlov’ p. 15). Secondly, a decision upon the detailed information is made, purposed to decide whether the project shall be executed. “in the planning phase the final decision is made by the politicians based on a business case for the project” (Financial Manager Interview 2).

Finally, in the third phase a valuation of the budget estimates is made. With use of the collected information the validation, based on a benchmark analysis of experience from similar projects already completed within the last couple of years chosen based on their characteristics viewed similar to the characteristics of the Copenhagen-Ringsted. Similar projects, was for this project found outside of Denmark, because this is the first railroad for high speed trains. The reference projects of this particular project, was 4 European infrastructure projects

- Betuweroute in Holland
- Kereva-Lahti in Finland
- Västkystbanan ved Falkenberg in Sweeden
- Nürnberg-Ingolstadt in Germany

“The reference projects are only selected to validate the forecast for the projects and, not to make the forecast. The documentation consists of references to the elements, in a determined standard” (Financial Manager Interview 2)

“We used reference cases for inspiration about the design solution, because a high-speed railway has not been made here in Denmark before” (Project Director Interview 1)

With this background information about the three phases and Hakon Iversen comparison of the Reference Class Forecast and this budget approach, I asked the financial manager if he saw the similarity. This question I did ask not because he is the financial manager of this project, but because he was involved in the development of the new budget structure in 2006.
I asked the financial director of his opinion to the use of reference class forecast as inspiration for the budget approach. It turned out that he did not agree on the reference to Flyvbjerg3 “there can be parallels, to Flyvbjergs thinking, but Flyvbjerg has no instruction on how the budget shall be used, he is more a critiques of the traditional budget approach and does not have an operational approach” (financial manager). With this quote the financial manager, point a gap between reference class forecast, and the operational level where the forecast is executed. A way to fill out this gap, is the operational approach applied by Trafik Styrelsen and later the ‘Copenhagen – Ringsted’ project team. “Our approach, or my approach, is instead to secure a strong budget trace and a structured collection of experience data from reference projects” (Financial manager). A budget track is important because it enables you to see the connections to the assumptions made during the project. He replies; “strong budget track require an ability to see the connection of the construction elements and the assumptions which the unified prices are based upon. This require clear guidelines for how to estimate the reserves, by incorporating the reserves into the budget for the construction elements, you can always see what is the raw construction element prices and what is reserves (...) if you do this it is not difficult to update the prognoses for how much the construction will cost and why” (Financial Manager Interview 1)

“If you have reference cases budgeting is not difficult” (Financial Manager Interview 1). On the other hand a bad budget progress can be expensive “I will argue that for a project like ours, with estimated cost on 10 billion, a bad process would make it cost 12 billion and a good design and construction process will make it cost 8 billion. So the execution approach is very important.”

After the construction owner has decided upon the costs and benefits, the project has been through the idea and planning phases. Thereafter the project description becomes taken over by a state owned organization In this case Banedanmark (http://uk.bane.dk/visArtikelBred_eng.asp?artikelID=1446). Banedanmark, provides the infrastructure that makes it possible for trains to run in Denmark. Banedanmark is responsible for 2,323 km of railway tracks. Approximately 3,000 trains run on the rail network every day. That adds up to almost 1 million trains a year. On a daily basis they are responsible for 40,000 arrivals and departures at stations all over Denmark. More than 170 million passengers and 15 million tons freight are transported annually on their network.

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3 Indsæt ref. – far har været med til at lave modellen
Banedanmark is organized with a functional administrative organization headed by a board, with project teams reporting back to the board. The project is managed by a selected project team at Banedanmark. Among other projects is the ‘signalling program’ and ‘Ringsted-Fehmarn. Copenhagen-Ringsted is an independent project organization but are still being held accountable “We report back to Banedanmark – Trafik Styrelsen not at all. We have been given a backpack of money and some rules and norms which we shall respect, both Danish and EU demands. But besides that we are we only supposed to execute the stated project description”’ (Financial Manager Interview 1) and as presented previously they are being hold accountable based on the construction law.

3.3. Idea Phase

In this phase, the project is going through a screening process (Financial Manager Interview 2). The Copenhagen – Ringsted project is far from a new idea. Improved capacity on this railroad section has been on the agenda for 20 years. Different solutions have been discussed In the middle of 1980’ the construction was improved with a new double track from Høje Taastrup to Roskilde. The first railway assessment for the section etween Copenhagen and Ringsted, was decided by the parliament in Denmark in 1997. 3 alternative railway
alignments were then investigated, However none of the alternatives was accepted, funding was not given and the project was put on hold until 2001. In 2001 a new law included the reservation of an area for a new railroad between Copenhagen and Ringsted through Køge.

3.4. Program Phase

The conclusion of the idea phase became to forecast and compare the two alternative design solutions. The decision making in the program phase was made with an intentional decision of leaving some research to later investigation. The Danish Transport Authority did not do all knowledge research before decision making in 2001, because they did not find the knowledge necessary for the planning phase. For example, they had not made a geological test, and the condition of present constructions was not covered among other things (Baggrundsmaterial ‘Miljø rapport 2’).

Instead the budgets were prepared “to evaluate if the project should be carried out or if there were other alternatives to the project” (Financial manager interview 2) And the CAD manager follow up: “The knowledge generation, which they chose not to investigate, is expensive and therefore not possible to get financed before the project is approved (CAD Manager Interview 1).

The forecast was primarily focusing on the overall design strategy and the costs of the project. These was the basis of a business case and baseline for a political agreement (Financial Manager I interview 2).

The forecast was a research on capacity improving alternatives investigated in the period 2004 – 2005, including the cost estimates for the selected solutions in October 2005. Trafik Styrelsen presented 4 construction solutions to evaluate upon. One solution was a new rail way and three ideas did imply improvements of the already existing line from Copenhagen to Roskilde and only suggest a new track from Copenhagen to Høje Taastrup. Based on this presentation the government decided in 2006 to go further with two solutions: 1) a new rail line Copenhagen – Ringsted and 2) an improvement of the existing rail to Roskilde, with two extra tracks from Copenhagen to Hoje Taastrup. In the
mean time the budget law was agreed upon the budget approach from 2006, inspired by Flyvbjerg which was presented in the introduction. The further decision making was therefore based on this new approach to budget making.

"the final design solution could have ended up differently. The final decision is depending on many factors for example who was the minister of transportation at the present time” (Project Director Interview 1)

The decision between these two alternatives became to build a new rail from Copenhagen to Ringsted. This was evidently a more expensive solution. However, the capacity would also improve much more. I will present the argument for choosing this alternative. To improve the basis for evaluation of the two alternatives a solution 0 was made, this was the decision of not making an new line and keep the existing solution as it was. The first of the two design solutions left was the Fifth Track Solution is primary an improvement of the existing rail between Copenhagen and Roskilde and a track further to Ringsted illustrated with the black line on the picture above. This solution consists of an improvement of the existing railroad from Copenhagen to Roskilde. It was improved with one extra track for the long–distance trains based on existing technologies and the maximum speed of 180 km/h. Furthermore the solution would make an increased capacity for passenger trains with 4-5 extra trains per hour in each direction on the railway section. Less regional trains would be forced to stop at the smaller stations between Copenhagen and Roskilde, which would as a side effect decrease the travel time also for the town vest and south of Roskilde. This would improve the overall capacity with 40-50 pct for passenger trains and 60 pct. for cargo trains. This is in total 4 to 5 more trains, however driving with the same speed as today (Baggrundsmateriale sammenligning af nybygningsløsningen og 5 spors løsningen).
The second of the two solutions was The new rail Copenhagen – Ringsted. This solution does not offer any improvements between Copenhagen and Roskilde. Instead, the capacity between Copenhagen and Ringsted will improve considerably, with the construction of a double-track line from Ny Ellebjerg station through Køge to Ringsted. In comparison, the establishment of the new rail solution enable up to 26 passenger trains and 2 goods train can pass per hour, in each direction. This improves the capacity between Copenhagen and Ringsted with 90 pct. - compared to today. Furthermore the rail will also improve the speed with passenger trains to optional 250 km/h that require a technology which is not used in Denmark today. After analyzing the two alternatives Trafik Styrelsen and Banedanmark analyzed and compared the two solutions regarding their capacity. They also compared these two with the alternative zero of not making any construction.

“Normally only one solutions will remain to this phase, but the politicians would not agree if it should be the 5 line solution or a new rail.” (Project Director Interview 1)

“All people who is working in this sector did know that the Roskilde solution (red. 5 line solution) was a sick idea.” (Financial Manager Interview 2)
The two solutions were also analyzed through their estimated budgets. What separated them were the expenses and risks. The 5 line solution was a standard solution according to the required speed of 180km/h, which has been processed in Denmark through the last 10-15 years. The new rail solution was estimated to cost 6.5 billion dkr. (2005 prices) and was estimated more than double than the 5 line solution, which was estimated to 2.6 billion Kr. (2005 prices).

The decided design strategy became the ‘new rail’ solution. The new rail increases the capacity, however the project is also more expensive. Also it becomes more complex and implies more stakeholders to take notice of regarding the citizens, land owners and also protected environmental and historical areas. The line will go through areas, which the 5 line solution would not have. One of these areas is Vestvolden, which is a protected area. This evidently increases the uncertainties and elevate the costs. Vestvolden is an area in Copenhagen which is protected both for its environmental value, but also for its historical value of a burial mound and memorial monument which is preserved. Regarding the meeting with neighbors and land owners, the team has at the present time in the project experienced challenges with the McDonald at the highway in Solrød, which they had planned to remove. This negotiation cost both time and money for the project and more than they had expected. However the team did contact the fast food chain early in the process, it was challenging to find a new location which could offer the restaurant the same customer friendly location as they have today, "we ended up with a location next to the existing location (...) this demanded rearrangement of the roads and establishment of a screen along the rail to protect against noise from the railroad" (http://www.bane.dk/db/filarkiv/13872/250%20november%202012.pdf)

The final decision of making a more expensive design and taking a larger risk was a political decision “It was only a political game, about a Roskilde politician who wanted the railroad to go through Roskilde” (Financial Manager Interview 2)

The decision of the New Track Solutions, was a effected by the political agreement "A green transport policy" of January 29, 2009. The agreement was made by the following political parties: Venstre and De Konservative plus Socialdemokraterne, Dansk Folkeparti, Socialistisk Folkeparti, Det Radikale Venstre and Liberal Alliance. This agreement include the Femern connection, a tunnel connecting
Denmark and Germany. The ‘Copenhagen – Ringsted’ will be further connected to the Femern tunnel through a track from Ringsted to Femern (Copenhagen–Ringsted is headed by Project Director Jan Schneider-Tilli). The New Line Copenhagen-Ringsted is of international importance as a part of the Trans-European Network that will link Scandinavia and the rest of European. The railway is also a significant part of the freight corridor from Northern Sweden to Northern Italy. The potentials of freight traffic - and international passenger transportation by rail - will increase after the opening of the Fehmarn tunnel Fixed Link and the associated upgrading and expansion of the line from Ringsted to Rødby. (http://uk.bane.dk/visArtikel_eng.asp?artikelID=15483)

Furthermore the one hour plan was decided. This is supposed to cut the train travel time between Copenhagen, Odense, Århus and Aalborg with one hour compared to today. Before the final agreement and however, the other agreements required the New line Solution via Køge.

All parties did prefer the new rail solution because this was the only way to overcome the goal of the timetable. However, the final solution was first agreed upon two years after the questioner that stated that they did all agree on the new rail solution (http://ing.dk/artikel/regeringen-spilder-millioner-pa-undersogelser-af-dodt-jernbanespor-90945). Solution was not chosen before in 2010 because local politicians in Roskilde were very focused on making the rail going through Roskilde as the 5 line solution suggested. This process was a waste of resources according to Per Christensen from Aalborg University’s Department of Society Development and Planning. It has cost 70 million to asses this solution, however no politicians was expecting to vote for this solution and because other agreements had been made (the fehmarn-connection and the timetable). http://ing.dk/artikel/regeringen-spilder-millioner-pa-undersogelser-af-dodt-jernbanespor-90945
3.5. Design Phase

In 2010 Banedanmark took over the project, a new double-tracked, electric railway from Copenhagen through Køge to Ringsted. The construction is planned to be finished in 2018 and the project team has the responsibility of its realization. When the project team received the project from the Trafik Styrelsen, they did also receive the forecast and budget material already made. However the financial assumptions and references were not traceable when the project teams reviewed the material from the Trafik Styrelsen this was realized when Banedanmark and the project team took over the data from Trafik Styrelsen. They received all drawings in PDF (CAD Manager Interview 1) and they therefore asked for the original drawings and excel sheets, but it was very challenging to get this information from the consulting firms eventhough it was Trafik Styrelsen who originally had paid for the data (Financial Manager Interview 1), because the building owner had not asked for this (CAD Manager Interview 1).

The CAD manager expresses: “We felt like that we were wasting time and no doubt we were wasting money”. The project team had to go back and remake many of the drawings already made in the decision program, but this was only the beginning. After they had managed to understand a bit of the drawings, a consultant started to do the layout and the next data challenge uncured. “The consultants delivered the drawings, which they were asked to, but the data was unreadable drawings, because it was made in programs which we did not have access to” (CAD Manager Interview 1). Again the project team could not track the source of the data used. Knowledge was lost and expensive resources were wasted. “It is a problem that construction authorities have not understood the importance of document control, but instead leave it to the consultants and completely have given up the project management (...)” in this quote the financial manager link the control of data, with successful project management (the financial manager interview 1). Later in the interview, he links the data control to efficiency, which indirectly means that a successful project is very much depending on good project management and organization. In the case of this project, it resolved in missed information and knowledge.
Therefore the project team decided upon the strategy "We want to construct the New Line Copenhagen-Ringsted European best-in-class by purchasing in competing markets, economy of scale and using state-of-the-art technology" (power point ‘banedagen’ delivered by the CAD manager).

3.5.1 Reader Clarification

3D CAD is a planning tool based on 3D drawings, which the construction industry has used for many years. The tool has not changed however its usability has changed. Because now Banedanmark collect all 3D drawing into the same CAD program. Traditionally all single actors within the sector have made their own solutions based on their individual challenges and dilemmas, but without the ability to cooperate with other areas within the industry. And there are many sub areas, just looking at types of lines; water, sewer, water, gas, oil etc. then there is the area of terrain which implies; trenches, roads, soil depot, and so on. Then there is pump stations, bridges, tunnels, harbors – basically construction is a big area, with many elements – all working without communicating as illustrated in the model below.
This has traditionally resulted in conflicts, between involved number of actors and a missing ability to communicate between this many actors has made it difficult to cooperate and avoid conflict between the individual activities. The CAD manager made an example from experience of similar projects; When the contractor responsible for the bridge, is preparing his part, he gets information from the railway contractor and put the information into his own system. In the meantime when the information was developed and the contractor build the bridge, the rail road contractor have got more knowledge and decided to move the rail track a bit to the left, but he forgot to tell the bridge contractor and just continues with his own job, which was to build the track. However, the result was that the bridge did not match the position of the track. This typically ends up as the project teams hurtle, because the two contractors did everything in the best meaning and without stepping outside the contract. It is therefore not enough that the actors are good at what they are doing if they do not coordinate or communicate.

Source CAD introduction power point ‘Banedagen’ (Translated from Danish to English)

Despite, from the missing communication between the actors, the client have not the control over the documents, which they received from the actors, but this information was instead left with the consultants. About this management approach, the financial manger explains: “The problem about leaving the document control with the consultant is that consultants get paid for how much time they use,
this means that the worse they solve their task, the more time is used – so they do not have much incentive to improve their work” (Financial manager interview 2).

The Banedanmark project team decided to challenge the traditional norms in the construction sector and stated to handle the document manage them self.

Today all actors involved in the project is required, to deliver data in the standard format, no matter if Banedanmark has the needed IT program to read the data. Previously the consultant could restrict the drawings to one single area without notice of surrounding areas; this is not possible anymore. About this initiative leading persons within and around the Banedanmark project team has quoted:

“The model secures high flexibility – both for the project teams demand and to the contractor wishes for data” (Hieu Trung Tran from Grontmij, Consulting 3D Coordinator).

“This has made the relative strength between us and the consultant very different from what is usually has been in Banedanmark.” (Financial Manager)

”if you cannot see it all together it is not possible to optimize; will we experience conflict or not? – can the train get through or not?” (CAD Manager)

“3D has become an irreplaceable tool for Your work. It makes an overview from the beginning, so we can see the different parts of the construction together. This saves both time and money” (Susanne Frank, Project Manager)

The 3D CAD tool opened up what used to be isolated environments without any communication between, and collected it on shared documentation platform at Banedanmark (CAD Manager et. all). This enabled the project team, and other actors involved, to see how a decision in one activity group affected the others as the project chef Susanne Frank expresses. The CAD manager who worked with the tool on daily basis explained that it is important to see all the actors together to optimize design and planning.
The model below is how the CAD manager explains the interaction of the several actors, who now are cooperating in one tool.

![Model Diagram](source)

Source CAD introduction power point ‘Banedagen’ (Translated from Danish to English)

Besides from the advantages presented above, it must be noticed that there are two important conflicts for the model to function correctly and to fulfill its goal about minimizing risk of coalition. 1) Firstly the model must be used in the planning and design phase, so eventual problems during the construction work, can be avoided. 2) Secondly all stakeholder should work with the same geometrics or geographic data (CAD Manager Interview 2).

Banedanmark experienced the effect of ownership regarding the 3D data, which had many side effects that the project team had not expected, when they decided upon the implementation of this tool. A positive result is that the rest of Banedanmark’s projects, the Signalling project and the Fehmarn project, have been inspired by the initiatives and are starting to implement the tool as a part of their project planning and management. Also industry organizations has shown interest “the industry have showed much interest of using 3D CAD for other large infrastructure projects, so I will not be surprised if construction projects outside of Banedanmark, will start implementing this tool into their organizations” (CAD Manager Interview 2).
“It was an eye opener, how important it was, to have ownership of the documentation” (Financial Manager Interview 1).

“we can see where all the inputs come from, so we easier can identify where the mistake has been made; is it us who has made a design mistake or is it the contractor who has been failing. This is of course still something we try improve” (CAD Manager Interview 1)

The 3D CAD tool did not benefit from the data made in the program phase by, Trafik Styrelsen, because the project team was not able to read the documentation due to the format which it was delivered in. Today the tool has improved the project management. As the financial manager expressed it was an ‘eye opener’ how important it is to focus on document ownership. And as the CAD manager follow up by presenting the important value of being able to identify the mistakes before they are made. For example, if the contractor responsible for the excavate does deliver his excavation profile in 3D, there will be no disagreements about the amount soil he shall excavate, because the CAD manager has checked if it does fit to the design phase. Just 10 cm. marked on the excavate profile means several of extra cubic meter earth which in the end would have made the excavate work more expensive. Instead, the CAD manager will be able to see the mistake before it occurs and in cases where the contractors have a reason and good idea which can explain the changes, the CAD manager can evaluate the pros and cons of a change in the solution and maybe she will add this. If she does so, the system will update the unit costs and the budget will reflect the changes (CAD manager interview 2). In cases where mistakes do happen the project organization is better suited to handle the following disagreement between them and the contractor or consultants.

Therefore, the result, in the construction industry, has historically been an increase of cost, accepted by the client and building owner. This has been without an explanation of the cost overrun and without being sure, if it was the client or the entrepreneur that caused the mistake and there was no chance to learn from the mistake.

The financial managers’ explanation of the fact that the Cad initiative has increased their share of the project management task (Financial Manger Interview 1). As presented previously the consulting firms have earlier had more responsibility over the document control and the document which they developed was send in PDF format and usually it was not made with notion of the other actors, which
is demanded today (CAD Manager Interview 1). Therefore the consultants’ work qualified has increased with the new use of 3D, because it forces them to improve their work because the project team can see their results in the 3D program. Furthermore activities that the consultants previously have handled, are now made by the contractors. This eliminates costs of delays caused by design mistakes – Which would cost millions (CAD Manager Interview 1).

"If the planned solution does not function, then you have perhaps two or three alternative solutions" (Financial Manager interview 1) This an ability enabled because they in the idea did investigate many alternative solutions and later in the design phase did do it again. The investigation was done again in the design phase, because data was lost in the process from the program phase in Trafik Styrelsen and to Banedanmark.

Besides from the introduction of CAD, this experience did also force a change of organizational structure.

3.5.2 In-sourcing Knowledge

The project team inspired by experience of and the fact that other projects are planning to incorporate the idea of using 3D CAD more actively in the management of large infrastructure projects I did find it interesting to ask more into which other factors around the 3D tool have affected the project teams positively in relation to their experiences. "The focus of insourcing knowledge is a part of a strategy to improve the organizations knowledge capacity (...) with the right people you can both make it smarter, better and much faster. The right people, they have perhaps a productivity five times as high as others.” (Financial Manager Interview 1). Therefore, the client organization has become larger than expected. At first, the client organization was planned to 20 employees, but today the organization has 50 employees. The increase in the number of employees is because they have taken over many of the activities, which usually were solved by consultants, including CAD. In particular the planning part has mostly been executed by the client project team “we have an old construction manager from The Danish Road Directorate on 76 years and he knows everything about building bridges and planning layout – he has very much replaced the consultants – actually they come to him with questions. He can replace 10 consultants, because he has so much knowledge” (Financial Manager Interview 1). In the mean time, the consultants who is involved in the project has also become more

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engaged, because they are working in the same office as the client project team, instead of from the consultancy head office. An initiative which has improved the face-to-face communication “They sit downstairs, so we can easier and faster clear out questions and thoughts” (CAD Manager Interview 2) and given the two organizations a space for both improving their work related interaction, and time to build also personal relationship, because they meet everyday instead of only in the constellation of project meetings.

The increased focus of insourcing knowledge and capabilities has also increased the requirements of the employed team members, both regarding the employee’s capabilities, and the number of employees. With the knowledge kept inside Banedanmark, the project is developing knowledge which is useful for coming projects, instead of leaving the knowledge by the consultants. The increased client organization has however resolved in decreasing the number of consultants involved. Meanwhile the consultants left are also invited inside and have become engaged at the same office as the project team. This has enabled them to accumulate knowledge inside the organization and this has enabled them to handle complexity. But it is also a way for the project team to control the consultants and also improve the important dialogue, which previously has been a challenge for such projects. “Today they have a current dialog, which has proven a decrease in tacit knowledge among these two actors” (CAD Manager Interview 2)

Regarding the increased requirements of the employees’ capabilities, the financial manager explains that the particular team has been able to challenge the norms, not only because they have a 3D CAD tool, but also because they have an adaptable organization which has been flexible to the positive inputs and challenging task which always will be a part of a construction project. He explained that “It is important that the team consists of people who have knowledge about construction work and executing a project like this. Also they must be able to- and willing to challenge the norms. That competence was e.g. valuable when the team challenged existing norm to high and wrideness of the space the train has under a bridge” (Financial Manager Interview 1). The organization did know that the norms regarding height and wideness and they were ready to challenge these norms and reduce the height and wideness under the bridges, because if succeeding this could of cause a reduction of the costs. They ended up changing the norms and reducing the height compared to usual standards (Financial Manager Interview 1). This acknowledgement was however not rewarded, because as the CAD manager explained this was not a part of the project task, because this was made according to the norms within the industry. However, something in the organization must have encouraged them to go in this innovative direction. I will argue that the stated project vision is the main reason for the
added focus on innovation. All the interviewed persons mentioned the vision about being “best in class”.

"We want to construct the New Line Copenhagen-Ringsted European best-in-class by purchasing in competing markets, economy of scale and using state-of-the art technology” (power point ‘banedag’ from the CAD Manager)

This strategy is however a ongoing process and the CAD manager expresses that they in particular will focus on further improvement of their communication and cooperation, because even though they have already experienced great improvement, they believe there is potential for continuous improvements down the road. They did also expect this when they started the solution to the project “we knew that they money spend on the 3D CAD development and implementation might not be paid back with its advantages for the ‘New rail Copenhagen – Ringsted’, but it is expected to also have a future value for other projects inside the Banedenmark organization’ (CAD Manager Interview 2). Later the initiative has also gained interest among other projects and the expected benefits havr increased (CAD Manager Interview 2).
4. Analysis

The following chapter will analyze the above presented case based on relevant theories. By combining the practice-oriented context with the theoretical discussion presented in chapter one. This analysis is focused on answering the research question, about how and to what extent planning is used to process the ‘new rail Copenhagen – Ringsted’ and what the reference class forecast had added to this process. This shall lead to a discussion about innovation within this project. The discussion will also include a theoretical discussion of the project management approaches presented in the chapter one. Besides, from the theory presented in chapter 1, the case story also represents a theory of project management in its form. The case story is a third solution and as such, it will qualify and serve on the same terms as the two theoretical project management approaches. I view the case story as a context-dependent tried and validated theory. I have chosen to do this, because during my case study I have experienced interesting solutions to theoretically presented problems.

In the case research, I have experienced problems the theories views as challenges whereas they have not been it this project. These are black swan episodes, which that the theories approaches to be limited in practice. This is the case for both project management theories. It is here important to notice, that when I disqualify parts of the two theoretical project management approaches, it is not because it does not have a relevant quality. It is because it is not suited for this particular case. The episodes are therefore one black swan out of numbers of white swans.

There will also be places in my analysis where I present the case applied solution, because I find it relevant for answering my research question or because it offers inputs to the theories. The analysis mostly focuses on the reference class forecast, because this is the preferred approach for this project. The analysis will outline why this is the preferred method and how this is limiting the project, but also why it is an approach, as limiting as the Scandinavian approach advocates for.

The structure of the analysis is similar to the theory discussion outlined in chapter 1. Therefore, the first section will analyze the homogeneity within project management and combine the case story experience with the two differentiated views in the applied theory. The section is introduced with a
episode presentation which underscores that the project is a homogenous project with standard solutions, however the problems it is solving is not homogeneous and static and is therefore challenging Flyvbjerg's argumentation. Following up on this episode presentation, I analyze how this respond to the two project management theories view on homogeneity.

In the next part I introduce the second disagreement between the two theories, which is the view on buyers of optimism. This chapter’s argumentation is very important because optimism bias and strategic misrepresentation is the central part of the Reference Class Forecast argument for ‘cutting directly to the output’. It is therefore the most central part of the argument of applying this project management approach. I will use the case experience to test how of optimism bias was a challenge for this project. The strategic misrepresentation also be included in this section, however it is more difficult of outline, as presented in chapter one. Again, I will present episodes to make my analysis. Followed by the two theories views on the case experience. The third management dilemma discussed in the theory discussion, was the project structure. If the project process should be managed as a linear process or if it should focus more on learning. This will be analyzed with the headlines of fan episode to problematize and thereafter an analysis of how this affects the theories argumentation.

I am aware that the analysis is a result of single episodes and only relates to this particular case. It is not a generalization, but instead a selection of episodes, which falsify parts of the two discussed project management approaches. The episodes are therefore black swans the theorists have not expected when they did made their assumptions and conclusions. There will also be part of the analysis where the black swans (unexpected episodes) is empirical. For example episodes the forecasters of this project did not expect to happen. These I bring in partly because they evaluate the project management for this particular project, but mostly because they show Reference Class Forecast limitations in practice. In addition they serve as a basis for later discussion of the Reference Class Forecast as the preferred project management approach.

The episodes applied in the analysis are all episodes in the case story. To improve the critical view there will be new quotes from the project chef and financial manager. The quotes are different from the case story, because they are particularly talking about the three theoretical focus point, which in the theory discussion, was proven relevant for further research.
4.1. Project Homogeneity

Flyvbjerg says with his Reference Class Theory “argued that the prevalent tendency to underweight or ignore distributional information is perhaps the major source of error in forecasting (...) using such distributional information from other ventures similar to that being forecasted is called taking an outside view” (Fyvbjerg, ‘From Nobel Prize to project management: getting risks right’ 2006, p. 7-8).

The solutions applied for this construction are standard solutions. Therefore it is obviously a homogeneous project, because of the standard solution. As the project Director says “It might be the first time we in Denmark are constructing a high-speed railway able to drive 250 km/h, but it is definitely not the first time in Europe.” (27)

Nevertheless, an unexpected episode challenging the assumption of just taking an outside view to improve the quality of the cost benefit analysis it that Fehmarn tunnel changes the benefit estimates. This is a argument which need further research, but the continuous improved ambitions regarding the benefit of the railway show that the benefits are temporary and therefore hard to state based on reference cases.

The case exemplifies that a standard solution does not withhold standard goals. Because the problem, the solution should solve, did change over time. In this project the value of the benefits did change, because the benefit reference point changed after deciding on the Fehmarn connection. This new condition demanded both a high-speed train and the building of one all-new railroad. This changed the reference point and affected the goal for the construction. The first plan of only improvements was therefore not enough and the goal that seemed rational in 1997 became irrelevant when the environment and reference point change. Therefore the benefits were difficult to outline.

4.1.1 Reference Class Forecast Contribution?

The Reference Class Forecast recommends project managers to take outside standing view.
“argued that the prevalent tendency to underweight or ignore distributional information is perhaps the major source of error in forecasting (...) using such distributional information from other ventures similar to that being forecasted is called taking an outside view” (Fyvbjerg, ‘From Nobel Prize to project management: getting risks right’ 2006, p. 7-8). However, the benefits were challenging to state based on an outside standing view. This approach was an important activity in this project, when they estimated the budget. It is not yet possible to conclude if the estimates are enough, but according to both the financial manager and the project director, they are expecting to stay within the budget limits.

This project could take advantage of a outside standing view, because it is constructing standard solutions. Therefore the prices would be well known. This was a advantage because high-speed rail-ways has not been made in Denmark before. Inside information about such construction solutions were not present in Banedanmark.

“The Copenhagen – Ringsted project is planed with the bottom up principle⁵. We simply just said: ‘based on experience prices, which we know from other project we estimate what the Copenhagen – Ringsted project will cost’ (Project Director Interview 1). For this project the reference cases were useful tools to verify the budget estimates. The Financial manager did in particular recommend the outside standing view to estimate the unity prices, as presented in the case story. The Reference Class Forecast was therefore part of solving what the project director calls the largest challenge for construction projects.

“The most challenging part is actually to calculate the price of the project. Because when you do not do 100 of its kind. How can you know how to estimate what the railroad will cost” (Project Director Interview 1)

The challenge of estimating and verifying unity prices is a area for further research because it is very important for the budget estimate. This is according to the financial manager an area which has room for improved knowledge.

⁵ A bottom-up approach (also known as inductive reasoning, and in many cases used as a synonym of synthesis) is the piecing together of systems to give rise to grander systems, thus making the original systems sub-systems of the emergent system. Bottom-up processing is a type of information processing based on incoming data from the environment to form a perception. Information enters the eyes in one direction (input), and is then turned into an image by the brain that can be interpreted and recognized as a perception (output
4.1.2. Scandinavian Approach Contribution?

The Reference Class Forecast was useful to estimate the costs and less useful to estimate the goal according to benefits. In this case, it was a limitation of the Reference Class Forecast and in worst case scenarios the construction would be made without relating to present needs. I therefore asked the project director if he did not find it terrifying to manage the project toward one goal, well knowing that it just as easily could have been another project goal, which was decided upon? To this question he replied:

“Yes, it is a challenge, but it is because we made a construction law which is closed. When the business case is agreed upon and when the construction process start (...) stopping the project will have terrifying consequences” (Project Director Interview 1).

It is hard to conclude what the Scandinavian approach would do to solve this problem. Because it is what it would call a wicked problem, defined as:

“Wicked problems, describe a problem that is difficult or impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to recognize. Wicked problems are ones for which there is no clear stopping rule – you cannot say for sure that you are done with the problem. Working on it more might well bring forth a better solution. There is no single right answer and every attempt can matter because it affects the things people depend upon.” (http://lexicon.ft.com/Term?term=wicked-problem). About wicked problems, the Scandinavian approach proposes that theories like the Reference Class Forecast should stop focusing on planning and forecast, because planning constructions as wicked problem.

Instead the Scandinavian approach argues that focus should be on the goal setting since it is not possible to define the problem. Because, while the Reference Class Forecast will explain the change of goals due to a lack of and outside view, the Scandinavian approach will state that, this is a part of the necessary learning process. A learning process that improves the quality and strategic benefit of the construction. The Scandinavian approach recommend that the result of the project should be open until the results are known, which allows for a definition of success based not on previous experience but on what the situation has allowed for, thereby reducing the “ok, but what could have been achieved?”
This approach, did this project also apply to during the idea phase and program phase, and the goals changed based on the situation. Yet it also shows a challenge of on the one side needing to state the benefits of the project and on the other side noticing that the experience of this project is that the project goal and benefits changes based on external factors. Which, in some ways, can be a critique of the Reference Class Forecast, when it outlines

“The analysts should therefore make every effort to frame the forecasting problem so as to facilitate utilizing all the distributional information that is available” (Kahneman and Tvesky, p. 316, 1997).

4.2. Optimism Bias and Strategic Misrepresentation

The next theoretical discussion if optimism bias and strategic misrepresentation is a challenge. These are Flyvbjergs most important argument for cost overruns. Meanwhile the Scandinavian approach outlines the importance of the humanity and does not believe optimism to be the problem-causing cost overruns. This case shows examples of episodes where optimism bias should have occurred, but did not. Further the Project Director outlined the focus of buyers of optimism as an outdated problem.

In the case story, I did present how the project team did receive the project description, but they figured that the documents and drawings were including tacit knowledge. They did want to understand the basis for the decision-making. Their view on the material was critical and not buyers of a plan which they did find tacit. This episode is in line this the Project Directors’s reaction, when I asked him if buyers of optimism exist at Copenhagen-Ringsted:

“No, not in Copenhagen – Ringsted. I can guarantee you that there is no optimism bias in the Copenhagen – Ringsted project.”

Optimism bias has decreased with the new organizational structure and so are the spaces for strategic misrepresentation. This is because of the changed organizational structure, both inside the project team and in relation to the government. The government structure has changed during the last years,
as presented in the case story. According to the project Director, this has eliminated optimism buyers.

“I will say that, this sector has during the last 20 years been through a process in a more realistic direction. All projects was chronically under estimated (...) has now become fewer because of the improved budgeting process, objectivity and organization. And finally the project members have more experience (s. 30). These four elements challenge the value risk buyers of optimism. The four elements are the budgeting process, objectivity and organization. These are all initiatives, which differentiate from Flyvbjerg’s solution, and therefore an unexpected solution. The solution both eliminates and supplements Flyvbjerg’s argument of bypassing optimism buyers through planning.

As presented in the introduction to this analysis I will also use the case study as project management theory, because I believe this is offering a contribution to the presented project management literature. I believe that the solution of buyers of optimism is interesting. Therefore, I will shortly analyze these four elements of the solution.

The Budgeting Process.

Reference class projects were used to verify the estimates, an activity which was one of the three elements in the new budget approach, implemented in 2006 and as presented, inspired by Bent Flyvbjerg’s ‘Reference Class Forecast’ aimed at infrastructure projects.

“Reference class forecasting does not try to forecast the specific uncertain events that will affect the particular project, but instead places the project in a statistical distribution of outcomes from the class of reference projects” (Hahneman & Tvesky, 1979b, p. 326). Nevertheless, the reference projects did not have the expected value for the forecast, because there was not enough data (distribution information) needed to make it statistically usable (Flyvbjerg 2006). This is a limitation within the Reference Class Forecast. As the case story also reveals Flyvbjerg’s theory it is difficult to apply in practice and it is not enough on an operational level (Financial manager interview 2). Therefore, the reference Class Forecast is in this case supplemented by a flexible budgeting approach. Focused on traceable decisions. As presented in the case story and this is according to the project Director one of the four reason why buyers of optimism is not a problem anymore.

Objectivism and organization
The second reason is improved objectivism and, the third explanation is organizational structure. This explanation is in line with the improved objectivism. Because the objectivism has been improved through a re-organization of the industry.

The organization between politicians and Banedanmark and the organization of the project teams’ relation to consultants and contractors. The organizational structure has improved since Flyvbjerg made the Reference Class Forecast and these initiatives have improved objectivism and decreased optimism bias. The re-organization of the project teams in relation to consultants and contractors was caused by because of an unexpected episode. As presented in the case story, the project team acknowledged the need for a knowledge management strategy and they introduced the CAD solution. Until this episode, the reference class forecast had been the main inspiration for the decision-making, but now Banedanmark saw what could happen if the distributed information and forecast was not managed correctly. This project revealed that "The consultants are very happy to design and coordinate, but they are typically not very good at design management." (Project Director Interview 1). and as the financial manager adds, “they do not have a interest in overcoming the budget plan. Consultants are paid per hour spent, and therefore they do not have incentive to improve the costs. It is therefore a challenge that they previously have been in charge of a large part of the design management” (Financial Manager Interview 1)

The second episode, which minimizes the risk of optimism bias, was the establishment of Trafik Styrelsen. This is a organizational initiative pursued to be an objective forum with no personal interest to strategic misrepresent. Because they are measured on their ability to be objective. “Trafik Styrelsen was established because we did realize a need for a object controller who could advice the politicians to make decisions with more rational arguments.” (Project Director Interview 1)

Based on these initiatives the project director concluded that the Copenhagen - Ringsted was not challenged by optimism bias, and that the sector in general has found a way to eliminate this tendency with some inspiration from Flyvbjerg, combined with improved organizational structure. He says that “If optimism bias is present today, it is very rare and not even close to how it was when I started working with this kind of projects 20 years ago.”

Meanwhile the Financial Manager disagree with the project director. He replied that optimism bias exist. “Yes there is no doubt that he (red. Flyvbjerg is right) about what he calls optimism bias. This is mostly driven by the polittical level. Because they sometimes misrepresent when they and a business
case to be accepted. (...) this did also happen for the Copenhagen - Ringsted (...) this happens everywhere” (Financial Manager Interview 1). In contrast to the project director, the financial manager focused on the politician’s and their incentives to strategic misrepresent. The politicians ordered the budget. The budget was made in Trafik Styrelsen, which is supposed to be objective. I will not conclude on their objectiveness, especially not when two of my interview person have different opinions on their ability to objectively make a budget.

4.2.1. Reference Class Forecast Contribution?

The Reference Class Forecast and its focus on optimism bias proved not to be an important problem in the Copenhagen-Ringsted project based on the outlined episodes and comments on this particular problem. However, as the financial manager presented, there is still a need within the political system to eliminate buyers of optimism. The buyers of optimism however is not as big a problem as it has been. This is evidently an argument, which requires further research to qualify this as a general development in the sector. I must also point out that the project director is not interesting in talking negatively about the project. I view his argumentation of the improved organization as valid arguments according to organization theory.

On the other hand, buyers of optimism is still present on the political level. This is a challenge initiative because they are the decision-makers. As presented, it would be very expensive, almost impossible to stop a large infrastructure project when introduced in the design phase. Therefore, it is important to make rational decisions in the planning phase. In this project, the use of reference class forecast did help to decrease strategic misrepresentation among politicians. In particular to estimate the costs for the business case of this construction. With improved business case buyers of optimism decreased. However the political optimism is not possible to fully to phase out, because those are the construction owners and not measured such as the project team is. They are only measured based on the voters, but in this case it will make no difference, because all politicians did agree on the solution.

4.2.2. Scandinavian Approach Contribution?
The business case for this project focus on being rational decision both according to the costs (financial manager interview 2) and design (CAD Manager Interview 2). This challenge the Scandinavian approach who connects to an extensive critique of rationalistic decision-making (March, 1992; Cyert and March, 1963). The critique of Reference Class inspired projects, missing ability to be thinking strategic, is not right in this project. As presented in the case story, this project did, make a strategic decision and introduced a CAD solution, because they experienced a need for such a solution.

The CAD initiative and knowledge management, is a strategy, which the team developed as an extra initiative besides the project goal demands defined by the politicians. This is an unexpected episode according to the Scandinavian Approach which does not believe that a Flyvbjerg inspired project will be motivated to think outside the box and make initiatives which are not part of the goals they are measured toward. This does partly eliminate the Scandinavian critique of the Reference Class Forecast. However, it could be a single case example, and many external reasons could have forced this result. This example is a black swan to the authors, who argues that Reference Class Forecast kill human motivation and adaptability. Other factors could be the government structure, which result in a minimum amount of control as long as the team do not go outside the project conditions. Personally I will explain the episode with reference to Weyer, who says that after all: “those goals, which appear desirable, hold a greater value than those goals, which appear less desirable and can therefore force unintentional change of the pre stated goal. Similarly, there are so called anti-goals, which influence an individual’s motivation. A goal, which is very undesirable, holds a great value for the individual to ensure this anti-goal is avoided” (Birgit Weyer, p. 20, 2011). Tough this quote is in line with the Scandinavian Approach and is something that must be further investigated if other similar projects also act innovative even though they are controlled by a forecasted plan, because the reason could easily be found in the project team and not the management approach.

4.3. The Project Process

The third and final presented difference between the two approaches is the project process. The case shows that the linear process is necessary due to the governmental structure between the parliament, Banedanmark and the project team (financial manager interview 2). Therefore the construction law was made, as presented in the case story. It is a special Danish approach to have a construction law. Besides other things it is part of defining the process as linear. It is a linear process because it is a
state owned project and the decision makers are not a part of the daily project work. With the construction law the project team receive a ownership inside the limits of the construction law. This provides both limitations and potentials. When the project discription is not enough they must ask the politicians. Therefore, when a new idea arise such as major change of alignment, for example the CAD initiative, they ask the politicians. By a new idea of how to build the product, they do not need to ask the politicians. Only if they get the idea of changing the overall plan. Such ideas are handled as a completely new project “We view new ideas as a new project, and process them in a linear process starting with the idea phase” (Project Director Interview 1)

The Project Director explain that most of the tome, they keep the project inside the requirement from the idea and program phase. But they did have a experience in the design phase where they did have to change the plan. Then they did make a new project that started in the idea phase and was thereafter decided by the politicians in the planning phase. The change of goal was because of requirement from the municipality of Ringsted.

“we do have design ideas which did change and had to get a political accept of the change. It was a new Construction in Ringsted. The original plan was to make a very simple construction, but now is it totally changed and we make a new design, enabling to 200 km/h. This was a very large change and we did have to make it a individual project with its own project process.” (Project Director Interview 1).

However, the process structure is still flexible and the project team has authority to make decision without conflicting with the requirements for the construction design and price. To outline the flexibility, possible in the linear process I will mention two episodes, presented in the case story. Episodes the project team handled and was empowered to manage, however they demanded activities not directly described in the project description. The first episode is the negotiation with McDonalds and their unexpected feedback to the planned railway track. The second example when the project organization increased in number of employees due to the new knowledge management strategy and CAD implementation.

The McDonalds episode increased the project costs and was an unavoidable project risk. This is similar to Reference Class Forecast “Reference Class Forecast does not try to forecast the specific uncertain events that will affect the particular project” (Flyvbjerg, p. 8, 2006). This assumption Flyvbjerg was right about, because even though the McDonalds’ episode shows something that was
not planned, it probably would not have made any difference if the planners had realized this risk. On the other hand, it has a risk of the project team giving the Restaurant better terms than planned because of bad negotiation experience. However, in response to this argument, the project team have an updated knowledge on the project terms and other factors about the present environment, which can be useful during a negotiation. According to the case story, this negotiation revolved in a good agreement for McDonnalds and Copenhagen-Ringsted.

The second episode, which exemplifies the organizational flexibility, is when the team did challenged the norm about bridge building. The exact drawing of the bridge design was not a part of the plan; instead the bridge design was kept open until it was necessary to decide upon. By saving decisions the flexibility was improved as well as the and the quality of the decision, because time had made more knowledge reference points to compare the reference project with.

### 4.3.1. Reference Class Forecast Contribution?

Both the McDonalds and the bridge episode exemplifies that the project team is still being adaptable, even they are controlled and limited by the construction law and inspired by Reference Class Forecast. This exemplifies that though the preferred project management approach is the Reference Class Forecast - the project team is still adaptable. The Reference Class Forecast would say that because of the principal agent relation, there had to be control of the agents. The agents are not using their own money as if they were building their own house. It is Flyvbjerg’s philosophy that the Reference Class Forecast shall secure that the tax-payer’s money are used according to the right business cases. The stated business case are in the Flyvbjerg optic a rational and secured master plan with statistically proves for the cost and benefits. “first is made a political decision whether the business case is relevant. It is a political decision whether the idea shall go from idea phase to program and from planning to design” (Financial Manager Interview 2).

The business case was based on results from reference cases. To outline a critical view on this I asked the Project Director whether this is the best approach for this project.
“A successful project process is a process where you have been capable of forecasting, planning and thereafter applying change management and do control that the decisions are qualified” (Project Director Interview 1)

Nevertheless, this control focus has in this case been possible to combine with adaptability to the present environment. I will therefore again present the case solution, which is an interesting adjustment to the Reference Class Forecast. The Copenhagen – Ringsted, establishes a new project, outside the decided solution. This is a solution, in line with the Reference Class Forecast. Because the new project (part of the central project) is also going through the linear process.

Change management in this project is exemplified with the bridge example. This shows that the organization has room for changing the forecasted goal with a well-argued decision. A metaphor for this constellation is a black box, because this is a part of the project process the Reference Class Forecast theory just do not say anything about. This can be analyzed with as a sign of ignorance and that Flyvbjerg not sees it as important. Or it can be an example of something which the theory has missed in regard to another focus and a combination of these two. This case shows that the black box is manageable by the project team and the ignorance of operational guidance was not a black swan.

According to the findings in this case. Flyvbjerg did not make an operational solution, this became activated in the sector and in the project team. However, I will not make this a critique of Flyvbjerg, because he has never promised to offer operational approach. He offers a planning approach and leaves the operational part inside a black box. This example shall therefore not be understood as a critique of Flyvbjerg, but instead an example of the importance of operational management tools which can either supplement or replace Flyvbjerg. Besides, from a need for operational management tools this can also be explained by the missing amount of reference class projects to forecast such episodes. This would have been the Flyvbjerg response, because the point that the missing information is forcing bad decisions, due of statistical uncertainty.

4.3.1. Scandinavian Approach Contribution?

The Scandinavian approach recommend project teams and managers to be less hierarchical, because “Under a hierarchical strategy the project is well protected from the risk of unwarranted adaptations. “(Kreiner 1995 ‘In search of relevance: project management in drifting environments’ p. 342). With
the boundaries in mind, that a state owned project is restricted by. This project has showed adaptability as a supplement to this, however they are inspired by Reference Class Forecast, they did forex innovate the CAD solution.

“We did not know if the investment would be paid back based on its value for this project, though we figured that the investment was of great importance and need” (CAD Manager Interview 2)

They have not yet learned fully how the solution should function, its potential and limitations and how it should organize the actors. They only know that the solution was necessary and over time, they would learn and agree upon how the solution should manage the actors:

“we still discuss who has the responsibility for the relation between the contractor, the consultants and us. Because when you did deliver a paper this what ‘you’ was responsible for, but when you deliver a 3D drawing you are responsible for much more” (CAD Manager Interview 1)

This quote acknowledges the Scandinavian philosophy and the importance of learning and being adaptable team members who has the knowledge and ability to see when the environment is changing. Further that this becomes increasing important because the power relation becomes less obvious. Therefore, it is important to have communication between the actors. As well, from the technical solution such as CAD, learning is also improved by keeping the people who has built knowledge experience. The theoretical school within knowledge management, recommend the experience based knowledge management (Engberg, Lindkvist, Tell 2006). This means that knowledge must be distributed between people instead of in a knowledge bank like the Reference Class Forecast recommends. The Project Director explained that such strategy is already a success, because people who was involved in Storebælt (which made large cost overruns) later became part of the Oeresund Bridge project team. Here they did use their experience and this construction did not result in cost overruns. The distribution of knowledge between people is an interesting alternative to Reference Class Forecast. However it demands a more global working force. For example in cases like this, the needed knowledge did not exist in Denmark and people should be hired from countries with experience about building high-speed railroad.
4.4 Analysis Summary

The most important finding from the analysis, which I will bring into my discussion, was the value of reference cases to verify the estimates of the budget. Secondly, the interesting episode of the changes of project goal and needed benefit, which resulted in new high-speed railway instead of improving the existing. Third is the optimism bias, which is not a large project according to the Project Director. Finally that the organizational structure in a state owned project, makes it difficult to decrease the linear and hierarchical approach due to the distance between the politicians (principal) and the project team (agents), however it is an interesting discussion of another project process would improve innovation, such as some innovation literature claim (Kline & Rosenberg 1986)

5. Discussion

The result of the analysis is context depended and contribute only with momentarily view. This is useful to document the experience from this project and therefore it contribute to a practical purpose. As well it also offer new perspectives to theoretical thinking in regard to project management. What I learned through the case story was that there is a need for planning, because of the government structure. No discussion that it was challenging to plan the project because of uncertainty and many stakeholders involved and that this did result in limited innovative space and in worst case a construction goal which is outdated when the construction is finished. Nevertheless planning and forecasting the output is elementary, to decide upon a goal. This project has a government structure that demand stated agreement to push the project forward and gives the project team an environment where they can work, without political disruption with the quietness that they are fulfilling the task they are given and have the authority to do it.

"we are very happy to have the construction law, because it outline the political expectations very clear. This means that we can concentrate on the technical part and leave the political environment out of the process” (Project Director Interview 1)

This quote challenge the project management as is also the discussion that the two applied project management theories are discussing. This exemplify how the project manager does also experience this paradox in practice. it is a paradox because the two approaches is both necessary, though they
have contradicting recommendations. The quote shows that both applied project management theories are right in their overall assumptions. Their recommendations are also useful for the operational level of project management. However, they do also include a change for the operational level are to focused on the one side, the planning or the change management part. This is a risk which is important to be aware of. On the one side projects require planning and on the other side, it is with the risk of making a solution that becomes irrelevant.

The following discussion will outline how the two theories contribute to solving this challenge and how they do both have elements, which in this case showed to have contribute with. In the analysis, I was very critical about the theories and used black swans of episodes to create a critical view on the theories. This shape a picture of the impossibility of creating a universal project management theory. The operational level can always give examples of episodes, where the theories did not solve or forecasted the problem and therefore plans did have to be changed. Also the theories will also make examples that the organizational structure requires an agreement between the principal owner and the client organization (the project team).

This thesis has presented examples of such black swans and analyzed a selection in the analysis. The result of this I will bring to my concluding part where I will use the analytical findings to make theoretical recommendations. Besides, from theoretical recommendations I will also make recommendations for Banebanmark and the sector of state owned infrastructure projects. This last recommendation will follow up on this discussion, why it will put the theories in a more positive light an outline how they can contribute with ideas to improve the operational level of project management.

This chapter will direct a theoretical discussion about project management and the role of the project manager, based on the applied theory and case story of this thesis. In the Reference Class Forecast, he has a limited role. Thereafter discuss the effect of applying Reference Class Forecast as the preferred project management approach and if there are areas where the project team, however, apply elements of the Scandinavian approach. Followed by as discussion if the Scandinavian approach and the Reference Class Forecast can complement each other.

**The Scandinavian** approach has an important point regarding the importance of learning. The case presentation showed the value of insourcing knowledge instead of hiring consultants to solve the task and the CAD solution showed the importance of taking the power of the documentation.
I believe that the Scandinavian approach can add value to this project, with its view on the role of
the project manager. Because in a project of this size and a timeline with 10 years the project goes
through many phases. Therefore, the capabilities needed will also change depending on which
phase the project are processing. With changing need of capabilities, there evidently exist two solu-
tions. Must they either fire the team member and or project manager, which would result in the pro-
ject losing their experience. Alternatively, they must secure that the team members and the project
manager are learning and developing continuously with the project process. Here the Scandinavian
approach would value with their view on the learning process. A focus on learning I believe is im-
portant in a project like the Copenhagen – Ringsted. Because whit a changing team and project
manager depending on the skills needed will increase the risk of lost knowledge. When you work
intensive on a project, you develop expertise about its characteristics. As well, from the expertise a
employee can be without value for the particular activity in the process. Meanwhile they do have a
value and must be schooled to learn. Their knowledge is not written in the business case they might
not have realized its importance and therefor they have not written it in the project document. This
can for example be an architect who was part of the design phase and not necessary should be part
of the execution. It would make sense for her/him to find another work and the project could spend
the money differently. But, if a problem occurs according to a bridge, which the architect has de-
signed they would be able to remember how the design could be done differently and the improve-
ment of the design would be made much faster.

I argue that The Scandinavian Approach have an important point in regard to knowledge. It focus
on the user’s knowledge about the content, which is embedded in the system, and how this content
fits into the business process. When the knowledge is embedded in the system it is important to see
the value in the employers knowledge and not only the activity skill which they can contribute with.
It is important to recognize that some knowledge is left tacit (explicit) therefore important
knowledge will not remain tacit and is not possible to convert by viewing a project document or the
result from a reference case. In other words knowledge can improve and decrease value. It is not
static as Flyvbjerg views it. They value of the knowledge improves when it switch hands and/or is
put into another context. Yet this view point does not necessarily disqualify the Reference Class
Forecast, because distributed knowledge can be a good beginning for further developing this infor-
mation. This is a point where the two school of thoughts can supplement each other.
The theory discussion in chapter one showed that **the two theories are very different**. Their assumptions and definitions are different and therefore their conclusions are different. It is therefore interesting to see in the analysis that the two theories both have something to contribute with in this case. However, the case has the Reference Class Forecast as the preferred approach. The Scandinavian view has also affected the project management. For example when the team is changing their strategy from using consultancy knowledge to insource the knowledge. This is different from Flyvbjerg recommendation of taking an outside standing view. Meanwhile it is in line with the Scandinavian recommendation of improving the learning curve. The organization does with this strategy have a similar view on strategy as the Scandinavian approach, because they view knowledge as a value which stay inside Banedanmark and therefore it improves its value, compared to if the consultants did own the knowledge. With this example, we can see that the project organization has not taken a standardized project management approach, but instead they have designed it to their needs. Therefore, it is also difficult to say something general about the project management discussion, because the conclusion will always depend on the present project and present situation. Nevertheless, Flyvbjerg has made a great job by pointing out the need for information. The information collected from external references is also showed valuable for this project. However, the solution was not totally Flyvbjerg inspired they did take an outside view for the budgeting.

I find it necessary and interesting that Flyvbjerg and the Reference Class Forecast has received so much attention. The theory has become a buzzword which makes the politicians save for getting critic if the output are not as expected, because they did follow Flyvbjergs recommendations. Flyvbjerg have therefore become an object which the optimist can add to his goal and the goal will seems rational because the reference class forecast is applied to the forecast and therefore everything is save. To me it is a problem that one theory which is so young can achieve too much recognition, and I think for future research it would therefore be interesting to analyze the consequence if planners are not critical about the applied approach and further how and why Flyvbjergs approach has become so popular. Because if it is not for its value, the constructions owners who apply it, will realize a big problem when the construction is finished. Because however the project team is measured upon their ability to achieve the output, it is the construction owner who achieves the problem, and in this case it is the tax payers. And it is too late to be critical when the construction is finished.
Reference Class Forecast is good to overcome the requirement to the governmental system. Flyvbjerg states that, he is taking the view of the taxpayers and control their money. But, based on my research I will argue that Reference Class Forecast also enables initiative for the taxpayer money because it enable the preparation of a business case. Necessary because the political system is limited by different points of view between the parties and a game of lies and power relation. This is not an effective constellation when the task is to agree on a project. Why they need a common base line from where they can make decisions. This is a value of the Reference Class Forecast, which as fare as I am aware, Flyvbjerg does not mention in his presentation of the approach. Based on the experience from this case the Reference Cases Forecast is also useful to develop a business case, when the environment require a decision support document to make different actors agreeing on a goal however, they has different opinions about what is beneficial for the country.

The principal agent relation is forcing the need for planning and control. The politicians are the principal that hire a project team to execute a project. The politicians need an outlined business case to state a decision. In addition, the project team need a stated goal plan to be sure that they are executing the project as the politicians is expecting. When the parliament has accepted this project goal they stay with the plan, until something unexpected occurs. The conditions is suitable for the Reference Class Forecast that cut out optimism, from the project process and then also the role of the project manager as a value and knowledge adding assets able to improve the stated goal. Instead their task is to execute the project without asking critical questions to the plan, because this is not his task (Flyvbjerg 2006). The Project manager’s task is to follow the plan and secure that these are not ruined by optimism. However, this task is of decreased importance according to the analysis. That shows optimism buyers as a decreasing problem according to the interview persons. Meanwhile the analysis did show the project managers did receive good result by challenging the norms this indicating that the Reference Class Forecast give space for innovation as far as the project team actively work for it.

In the case of innovation, there are many approaches, and because of the focus in this paper and the number of pages available, I will not discuss them all. It is not possible to state anything final yet it is either the purpose. The purpose is to discuss the potential consequence of a national project management approach concerning large infrastructure projects that is processes linear. This does according to the theory has consequences both in passively and negatively about innovation. There criteria is important to investigate because there can be a potential of improving the focus on innovation.
within public projects. Because innovation is a pronounced focus for the government and therefore it is ideal to make innovation to a target. Besides from the organization of the development process there can be other factors which result in innovation of for example the capabilities of the people involved. This I will shortly touch upon after presenting what the innovation literature says about a linear process.

It is a ongoing discussion within innovation management theory, about the linear process versus the dynamic process Kline & Rosenberg 1986. The dynamic process is, similar to the Scandinavian project management approach, focused on the learning process and not staying in a linear process. The two approaches has been discussed much in the innovation management literature. The definition of a linear model is “in the linear model, there are no feedback paths within the ongoing work of development processes” (Kline & Rosenberg 1986 p. 20). In response to this definition, increasing numbers of innovation literature say, “in an ideal world of omniscient technical people, one would get the design of the innovation workable and optimized the first time. In the real world of inadequate information, high uncertainty, and fallible people, nothing like this happens. Shortcomings and failures are part of the learning process that creates innovation for every kind. Innovation accordingly demands feedback, and effective innovation demands rapid, accurate feedback with appropriate follow-on actions.” (Kline & Rosenberg 1986 p. 40). This quote does advocates for the linear Reference Class Forecast Approach will not be useful to generate innovation. The linear process is criticized for its missing space for feedback and redesign. However, in line with the Reference class forecast philosophy, the father of innovation, Peter Drucker, says that the innovative process also requires planning. He says that to master the discipline of innovation we must do three things (p. Drucker ‘The Discipline of innovation’ 1998 p. 1):

- Focus on the mission
- Define the results we are after
- Assess what we are doing and how we are doing it.

According to this response planning is necessary, also if the goal is innovation. Still, Drucker also, later in same article, state the need for flexibility. He defines innovation by “It is not being brilliant, it’s being conscientious. It is not looking at need alone, but looking at need and opportunity.” (Kline & Rosenberg 1986 p. 10) The looking at needs does the Reference Class Forecast do, but the looking at opportunities are forward oriented and is logically not an element in a Reference Class Forecast
approach. This does eliminate the reference class forecast as an approach that can be combined with innovation. J Schumpeter recognized that most innovations were the result of recombination of existing ideas: “To produce other things or the same things by a different method, means to combine these materials and forces differently” (Kline & Rosenberg 1986 p. 27). Nielson and Winther do later complements: “innovation in the economic system – and indeed the creation of any sort of novelty in art, science, or practical life – consists to a substantial extent of a recombination of conceptual and physical materials that previously existed” (Kline & Rosenberg 1986 p. 13). This outlines that the project management approaches has an effect on the innovative output and the space for recombining and building on old ideas is part of the process. Consequently, the recommendation of using Reference Class Forecast for stating a business plan is a good start. Therefrom a recombination must be improved through motivating and most important a communication, which improves the learning, curve take this project to a higher level of achievement regarding design costs and other factors which a project can be measured upon. The task most therefore be to improve, because this improvement can be used to further improve the next project. Like, so will the learning circle go, yet this is already started. As the Project Director mentioned the examples of cost overrun and change of time schedules is far from a problem like is has been. This development should be recognized and the Reference Class cases should also be used to document if this was achieved. This thesis is a part of this process, as I have presented episodes and black swans that in coming projects can be used as guidelines. Reference Class Forecast does not necessarily have to be only about costs and benefits. There are other factors of knowledge, which is important to distribute between projects. Though it is more challenging to distribute knowledge about for example the political process, compared to the final costs a finished project. However this I will try to incorporate it in my recommendations for Banedanmark and the state. These recommendations I will present after concluding on my research question. There will both be a recommendation to Banedanmark and the National Governance System and thereafter theoretical recommendations. In the part of theoretical recommendations, I will also include suggestions for further research.
6. Conclusion

The following conclusion will remark the findings, which my analysis and discussion have offered to increase knowledge and answers regarding the two different project management theories, which both offer proposal to improve the results within the construction industry. This is a challenging task, because both approaches have important observations regarding construction management. Therefore, my purpose was not to conclude anything general, but instead to make a case study to understand the value of forecasting and other planning, which the Flyvbjerg approach is based on and combine it with the Scandinavian approach. This thesis was necessary because Flyvbjerg has achieved increasingly attention and an increasing number of state owned construction projects are inspired by his theory for example the case project. This thesis did therefore take the task of testing the value of these theories about the alternatives to the theory and an in depth case study.

However, during the case study a third management approach did come to my knowledge, because as presented in the analysis the project team made their own approach to project management.

The starting point for this thesis was a curiosity towards the many samples of infrastructure projects with cost overrun, the hype of Flyvbjergs reference class forecast theory, and in general how to handle the risks in high investment projects.

The practical contribution of this thesis is a documentation of the practical experience of project management. Today the reference class forecast is the recognized and applied approach for the national planning strategy for infrastructure projects in Denmark. Although the interaction between the Reference Class Forecast theory, and the experience from practical use, has not yet been analyzed in dept. The analysis did show that reference cases was applied, but the needed knowledge was not present and therefore reference cases became also a source for inspiration, when the project team did need alternative design solutions. The outside standing view was not fully applied the forecasting and planning phase (program phase) because distributional information was not present. Instead the forecasting task became more a negotiation between the stakeholders. Due to the fact that the project had poor access to statistical data from reference projects, it was difficult to evaluate the effect of the Reference Class Forecast inspiration. Further is the project not yet completed and therefore the results can change many times during the execution.
The experiences from the ‘Copenhagen – Ringsted’ project indicate that the use of the forecast changes during the project, and how different management approaches can improve or lower the value of the forecasted knowledge. The definition and use of data documentation has developed through the project from its start in Trafikstyrelsen. Thus, a learning process has developed the distributed information. First data was delivered by experience from other cases and later the knowledge from this project became a source to correct the first estimates and develop the knowledge information. Flyvbjerg defines knowledge as static, this project team is very focused on the dynamics within knowledge and the flow of development which seems to go through during a project. What instead matters is who have the control over the knowledge.

This gives an idea of answer to the first research question: *How and to what extend are forecasts used to execute and plan Banedanmarks ‘Copenhagen – Ringsted’*

The forecast is used to make a business case and make the politicians basis for their decision. Thereafter forecast are in this project used as a guidelines and a baseline of knowledge that the project team can develop.

This question is broken down into following sub-research questions:

To the second research question: *How and to what extent is the Reference Class Forecast useful at Banedanmark for their planning and execution of ‘Copenhagen – Ringsted’ project.*

The Reference Class Forecast was useful to state unity costs and contributed to make a business case that enabled a political agreement. However it is not possible to say if the business case had been agreed without use of Reference Class Forecast it did have a positive effect on the decision making phase because it contributed with more information to improve the value of the decision-making. The access to reference cases was increasingly valuable for this project because of the design solution. A high-speed train has not been build before in Denmark and therefore foreign inspiration was necessary. Also in the execution of the construction was reference cases used. They were used as an alternative solution present, if the planned solutions showed impossible on experience.

Regarding the overall study question of: *how and to what extent is innovation a part of the project management in the Copenhagen Ringsted project.*

Innovation is an important part of the project as long as it is in line with their strategy of making standard solutions. Therefore, their innovations are directed improvement of the processes such as
the CAD innovation and second they are improvements of design regarding better or the same quality for lower costs. Innovation has in this project been possible, however the governance structure and the use of Reference Class Forecast. Subsequently it is my personal opinion that the Reference Class Forecast or the governance structure does not obstruct the innovative initiatives. Instead, it is because the project team is capable and has interest in challenging the norms and working towards being ‘Best in Class’ as their strategy outlines.

6.1 Recommendations

6.1.1 Recommendations to the Project Management Theory

Based on the analysis it seems interesting to further analyze forecasting as an investment, which does both cost money and take time. It is contradicting that the forecast on the one side is trying to decrease the cost overrun and keep the project finished on time. Meanwhile the forecasters of this project did spent 70 mio kr extra to analyze the 5 line design alternative. What is 70 mio worth in alternative investment regarding the projects. Further, research to the Reference Class Forecast it would be interesting to state the typical cost drivers for large infrastructure projects. This would make the approach more in depth because cost drivers would be more descriptive than just costs. Meanwhile I would also recommend the Reference Class Forecast to open up for an improved description of what occurs between the forecasting and the finished project. Based on the Financial Managers quote in the case presentation, this is a part of the theory, which decreases Flyvbjergs operational appeal. For example, are there planning aspects that the forecaster can save for later because the knowledge is not necessary in the planning phase? In the context of this it could be valuable also to analyze if forecast instead should have more a strategic function than a planning function. Flyvbjerg has named strategy as something to avoid, because it can lead to strategic misrepresentation. Meanwhile if the forecast and planning became increasingly strategic instead it would open up for adjustments.

For both the Scandinavian approach and the Reference Class Forecast I will recommend them to further research on optimism based on “The positive impact of optimism on physical and psychological health and the attendant characteristics of perseverance, achievement, and motivation resulting in academic, athletic, political, and occupational success, is well documented.” (Luthans/Church,
2002). This quote questions that optimism should be bypassed and it opens up to a theoretical field of human behavior. A field that the Scandinavian approach could take advantage of. To my opinion, the Scandinavian approach could benefit from by combining their arguments with human behavior theory. Theory similar to the quote above. Because they are focusing very much on learning and motivation it could improve the theory to use human behavior theory, because they are focused on humans in the theory. This could for example be investigated by applying Thomas Hobbes. He describes Human decision making and behavior as something that relies on motives that go beyond or against self-interest, such as pity, a sense of honor or courage, and so on. That part of Hobbes theory is interesting in the context of optimism bias because here he says that we shall do what you self-interest lead us to, because the alternative is what lead to trouble. Flyvbjerg define the opposite to optimism as rational thinking, but if rational thinking does not exist only self-interest the opposite of optimism can also be argued to be pessimism. The area of self-interest is already analyzed by Hobbes and should be an interesting combination for further research in regard to Flyvbjergs argumentation about strategic misrepresentation.

6.1.2. Banedanmark Improvements

The Government structure is regarding this project very successful, but as the Financial Manager did express the success of this approach is depending on the capabilities within the project organization. Regarding their ability to both adsorb changes and execute the plan. Therefor I will recommend Banedanmark to categorize which kind of capabilities such project organization does need. This case story showed that experienced employees have a value which has been very important. The experienced employee have replaced more than one consultant. However, young innovative student helpers have been part of new solutions breaking the norms. The organization does either seem afraid to make decisions, which speaks for an organization atmosphere of trust. There is not a very hierarchical organization structure, exemplified by the young student assistant being in a position where also he can challenge the norms.

I will argue that the CAD solutions and the control of data improved the ability of being adaptable and still have control and overview of the process. The question is however how future projects within Banedanmark can make use of this experience. Regarding this question, it is my recommendation,
that Banedanmark shall continue the development of their CAD solution as a strategic initiative that can improve all of their projects. As for the project team I will recommend them to be aware of the super star effect. They should keep being adaptable and not move their reference point to the time where they have already succeed, because they are not yet done with the project and if becoming lazy, the can end up being taken by the super star wave, which does not force rational thinking, a opinion which both school of thoughts can agree on.

On a national level, a knowledge database would be of great value. This is a recommendation in line with what Flyvbjerg has stated. About the value of access to reference cases. The database should include experiences from previous infrastructure projects. This is an initiative that can improve future projects. This project have used reference projects, with a positive effect. Both for the forecasting and for design inspiration and alternative solutions when challenges occurred for the planned solution. This improvee the quality of the forecast, while also enable the project teams to find inspiration when alternative solutions is necessary, as this project did experienced with the different solutions for a bridge. This knowledge base is however not developed and this project did collect the reference projects by them selves. My case research proves the value of knowledge and effect of structured documentation. Therefore I will highly recommend increased focus on this area of knowledge management within state owned infrastructure projects.

Even better it would be made in cooperation with the other Scandinavian countries, or maybe in the EU. This will enlarge the value of the knowledge bank because more projects will be applied and the statistical value will increase. However such transnational corporations can be a long term idea to implement, because of the increased number of countries which shall agree on the system approach. Most important is it to define the shared cost drivers, which the infrastructure projects shall be benchmarked upon. Alternatively to the national or transnational knowledge platform corporation, this could also make an interesting business case for a company. While there is clear need for information, in other words a marked demand. However the definition of the product will be as difficult as for the national product development. What would also challenge a private company, more than a public company is that they do have to build a trust regarding their capability to improve forecast, because easily the they take the politicians role and end up as the one to blame for bad outcome of a project.

The final recommendation for the Danish state owned project management, is based on my experience from the presented case story. This is also in response to the value of knowledge. I will recommend an improvement of the decision making process, useful to decide upon large infrastructure
projects. There must be space for dealing differently with the decision-making if only one of the suggested solutions is able to overcome the demands for the final solution. Today they are using the same approach as they do for all other agreements, but this case is different and they must have a process, which is more similar to a business structure. This could for example be the stage and gate model. This would hopefully eliminate the possibility of using 70 mio dkr on a research, which will never become used and furthermore in this case that much of the knowledge developed was not even filled and afterwards managed in a usable way. The first gate should have asked if both the solutions did match the general strategy of Danish infrastructure development, and this would have released the politicians for spending 70 mio on an analysis, which they did not need and the project could have been processed much earlier, because of a shorter decision making time, finally and most importantly the 70 mio. dkr. could have been used for another project.

The Copenhagen – Ringsted project is now in the construction phase and the cost and schedule look like it will succeed measured upon the stated plan.
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8.1.1 Enclosure

8.2.1 Interview 1, Bane Danmarks CAD Manager

• Hvad er din baggrund for, at være CAD manager på København – Ringsted projektet?

Jeg har en fortid som arkitekt og har i mange år arbejdet i Rambøll og her deltaget i flere byggeprojekter, herunder ombygningen af Nørreport station. Min primære erfaring er derfor fra byggebranchen, men jeg har været i anlægsbranchen siden jeg blev hyret som CAD manager i 2011.

• Kan du kort beskrive hvad begrebet CAD dækker over og hvad det bruges til?

Det traditionelle syn på CAD er, at det er et tegneværktøj. I gamle dage havde vi hovedlineal, blyanter, trekanter og så tegnede vi tegningen. Med CAD har man flyttet det miljø til skærmen og sagt ”okay” på en skitse som den her, hvad skal man kunne tegne og så har man uddannet nogen folk til, at kunne tegne på computeren i stedet. Og det var revolutionerende nok i sin tid.

- Og det betyder måske, at det kan være svært, at forholde sig til dem?


- Og de værktøjer kan ikke tale sammen?

Nej de taler ikke sammen, så de køre hver i sit miljø - og det ser rigtig fint ud. Dvs. vej-manden leverer en linjeføring til bro-manden, som ligger i sit system og begynder at arbejde ud fra det, så kommer vejmanden til at rykke vejen lidt eller flytte på nogle kvoter eller andre ændringer – det ved bromanden ikke noget om, så han kører videre – og så har du pludselig en vej der ligger her og en bro der ligger der. Eller med afvanding kan særligt være en udfordring i anlægsbranchen. For du har fx allerede lavet din skråning og linjeføring til afvanding og pludselig lægger ledningerne her grøfterne her og de passer ikke sammen. Så altså der er jo mange, mange eksempler, faktisk har jeg et diagram der viser produktiviteten i udvalgte brancher og den branche som har mindst produktivitet, det er bygge- og anlægsbranchen. Og aller lavest der ligger de rådgivende ingeniører og arkitekterne. Og det er simpelthen fordi du kører med nogle isolerede miljøer uden kommunikation imellem hinanden. Du er rigtig god til det du laver, du er bare ikke god til, at kommunikere med de andre og koordinere dit projekt sammen. Og det er ligesom det vi prøvede med et gennemarbejdet workflow og de her forholdsregler som vi har defineret på det her projekt. Vi har ikke kravet at de skal gøre noget nyt, ikke bruge andre værktøjer end det de er vant til og de skal ikke gennemføre eller kræve nogle nye

- Så det er værdifuldt beslutningsværktøj, så alle kan forstå og følge med i hvad der foregår?


samlet vil det dreje sig om mange, mange kubik ekstra jord. Hvilket betyder, at gravearbejdet bliver dyre end først antaget.

- Hvordan sætter i så jeres aktiviteter i udbud?


Den anden metode det er en fagentreprise. Og der sidder en rådgiver og en bygherre og afstemmer og derefter levere man kravs materialet til entreprenøren. Selv i den proces, specielt inden for anlægsprojekter, idet der ikke er noget krav om levering af originalt data eller 3D. da er den helt traditionelle måde, at entreprenøren får indsendt tegninger, men det er tit og ofte i nok. Fordi entreprenøren også bruger materialet som et intelligent værktøj. De bruger det til maskine styring i samarbejde med GPS og andet.

- Så de var forhen nød til, at udvikle videre på materiale?


Det betyder, at vi altid har dokumentation for hvad der er blevet lavet og vi kan altid læse det.

- Kan i mærke en effekt af de ændringer, som i har gennemført


Jeg vil ikke sige, at vi med vores metode delvist har fjernet dette problem, det vil nok altid eksistere i en eller andet form. Fx en ledning som ikke er registeret af lednings ejer. Men risiko for fejl er minimeret og det kan man spare millioner på.

Til gengæld skal der bruges mere tid, ressourcer og penge i projekteringsfasen, men du kommer uden om stillstand i løbet af projektet. Dvs. at 3d er mere omstændigt, men gevinsten vil komme i løbet af projektet.
Kunne du forestille dig, at den projekteringsfase som i har gennemført, vil forkorte arbejdet for andre bane projekter.

Ja de vil direkte komme til, at benytte vores definitioner og krav specifikationer. Jeg forventer, at vores standarder på sigt, vil være gældende standarder for hele Bane Danmark. Hvad for en tekst fond bruger vi, hvilken størrelse, hvordan skal tegningerne laves, det tror jeg er det næste trin og det vil gøre livet lettere for rådgiverne, så de ikke skal forholde sig til et helt nyt forhold hver gang de skal bistå et nyt projekt. Det vil også gøre det lettere for Bane Danmark da de så vil have ensartet dokumentation for alle deres projekter. Også entreprenøren vil have det lettere, fordi de så ved hvad de skal forholde sig til.

Sideløbende har vi et samarbejde som vi kalder det digitale anlæg, en branche organisation, og de begynder at se på vores arbejde. Så det betyder, at alle store aktører i anlægsbranchen forhåbentlig vil komme til, at bruge de samme standarder.

Arbejder 3D sammen med budget værktøj?


Det der er vigtigt for os, er at vi kan se hvor posterne stammer fra. Fordi så kan vi lettere identificere hvor fejl er begået fordi vi har en sporbarhed. Er det os der har lavet en design fejl eller er det entreprenøren der er gået galt i byen. Det er naturligvis noget som vi stadig arbejder med, at implementere, så alle parter forstår at bruge det. Det er fx situations afhængigt om man skal tage fat i volumen, længden eller andet. Det er derfor vigtigt, at markere hvilke poster der skal lægges sammen.
8.3.1 Interview 2, Banedanmarks’s CAD Manager

- Sidste gang talte vi meget om baggrunden for CAD, jeg kunne godt tænkte mig, om du kunne fortælle uddybende om de resultater i har opnået?

Først og fremmest vil jeg sige, at resultatet af CAD endnu ikke er endegyldigt. Vi ved for eksempel endnu ikke om løsningen vil tjene sig hjem. Det var jo en løsning og et initiativ som ikke var planlagt fra starten.


- På hvilken måde kommer det til udtryk?

Før i tiden foregik meget kommunikation over telefonen og så ringer man jo bare ikke så tit. Det er meget letterere at bare kigge ned på første hvis man har et spørgsmål eller en sag man lige vil drøfte. Det betyder også at vi alle sammen er meget bedre orienteret om hvad vi hver især går og laver, simpelthen fordi vi sidder i samme bygning.

- Du fortalte i det andet interview, at i har oplevet færre komplikation i design og udførelsesfasen, som følge af jeres CAD løsning – kan du uddybe det?

Ja det er helt rigtigt, CAD er et rigtig godt projekterings værktøj, fordi jeg kan se koalitionerne før det oprinder. Herudover kan jeg også lettere se hvis der er der er nogle udfordringer, hvilke konsekvenser forskellige løsninger vil have. Det så vi eksempelvis i forbindelse med lodejer forhandlin-
gerne. Da vi skulle forhandle med McDonnals kunne vi ikke blive enige om det løsning som vi oprindeligt havde forestillet os. Derfor gik vi i gang med, at undersøge alternative løsninger, inden for de rammer vi har fået tildelt. I den forbindelse viste CAD sig, at være et værdifuldt værktøj til, at evaluere de forskellige nye løsninger som kom på tegnebrættet. Vi vurderede dem langt mere effektivt end hvis vi skulle have tegnet de forskellige senarier i hånden. Herudover sparede vi en masse rådgivningstimer, fordi vi nu var i stand til selv at evaluere løsningerne. CAD var derfor en del af at overskue processen og løsningers relevans.

- Hvad så når der sker ændringer i din CAD tegning?


Det næste er de værktøjer som man bruger ude på pladsen, såsom maskine styring. Sammenlignet med når det er manuelt, så har man afsætningsdata x,y,z og så opnår man, at maskinen graver ud fra lige den profil som der er projekteret, det stiler naturligvis krav til projekteringen. Med det betyder også, at gravearbejdet bliver udført hurtigere og mere pålideligt resultat.
• Kræver det flere involverede folk til projektering?


• Har i alle ledningsoplysninger registeret?


De er sagtens i stand til, at levere i 3D, der er bare aldrig nogen der har spurgt efter det. Vi stiller ikke umulige krav, vi stiller krav som de kan leve op til. Så det er realistiske tilbud som vi modtager. Det er

Det er vores strategi, at få værktøjerne til, at fungere. Når vi så kan få noget geometri og sammenhæng ud af det. Så går vi trinnet videre og undersøger, hvordan kan vi gøre de her værktøjer mere intelligente. Ex når jeg peger på en væg, at jeg så kan se hvorfra den leveres og hvilket fabrikation

- Hvor mange år tror du der går før BIM er en realitet – bliver det dette projekt?

Nej bestemt ikke. Det kræver en stor investering og det kræver, at organisationen er villig til det. Hvis man skal have en fornuftig møde at gribe det an på, så skal du koble viden om nøglepunkter og tilknyttede informationer. Vi begynder med spæde forsøg med, ex. normering af brønde, men på et tidspunkt skal det blive muligt, at have de slags informationer i en database og så kan man derefter søge efter det. Så kan man lave digital tilsyn med din Ipad, stående på pladsen. På ipad skærmen ses din plan og så kan du se UPS’erne op pladsen - Der er en revne her etc. det er da både en gevinst ved tilsyn, registrering af mangler, men også i driftsfasen. Du bygger en bro på 1-2 år og den bro har en levetid på 120 år og i de år skal du kunne bruge de data til, at vedligeholde din bro.

- Du sagde tidligere, at har hentet meget information fra ex. Norge?


8.4.1 Interview 1, Banedanmark’s Financial Manager
Jeg hedder Niels Arildsen og jeg er økonomi chef hos Banedanmark

- Og hvor længe har du været hos Banedanmark?
  3 år
- Fra projektets start?
  Ja

Jeg har, kunne forstå på jeres CAD manager, at hendes funktion var et nyt tiltag – hvorfor valgte i det?

Først og fremmest var årsagen, at man valgte, at udvikle en CAD manual, det hænger sammen med, at vi ville fokusere på CAD og 3D. Det er produktet af en nødvendighed for CAD, som sikre sig, at de som levere bruger samme definitioner og standarder. Det vil sige, hvis man skal dokumentere projektet på tværs, så er forudsætningen at man har fælles retningslinjer i forhold til udnyttelsen af CAD.

En årsag til, at man gjorde så meget ud af CAD og især 3D, det var af hensyn til, at gøre dokumentationsarbejdet så effektivt så muligt og at entreprenørerne skulle give tilbud i det materiale, så også de der skulle give tilbud kunne arbejde direkte videre med efterfølgende når de skulle til, at bygge anlægget.

- Som jeg for forstået det, så var det et initiativ, som ikke var planlagt fra starten. Var der en begivenhed, eller bare almindelig sund fornuft, at i valgte, at oprette den funktion?

Der var ikke nogen bestemt begivenhed, det var et led i den strategi om hvordan vi vil udbyde og et led i strategien om hvordan vi ville sikre at vi havde kontrol og dokumentation. I anlægsbranchen, herunder Banedanmark, har det været tradition for, at der er rådgiverne der havde dokumentstyringen omkring både 2D og 3D tegninger og vi var klar over, at for at vi kunne kontrollere designprocessen, så var det vigtigt, at det var os der satte dagsordenen og rammerne for, hvordan CAD dokumentationen skulle udarbejdes. Det er i høj grad et spørgsmål om, at sikre kontrol og magt, fordi hvis vi har kontrollen over dokumentationen, så har vi dels overblik over hvad der skal laves og at det
bliver lavet på en måde så det kan gå videre til andre rådgivere og entreprenører. Vi oplevede i starten, at det materiale som var udarbejdet i programfasen af rådgiverne, dels havde vi svært ved at få det udleveret og dels skulle vi betale for at få det udleveret, selvom det oprindeligt var os der havde betalt for udarbejdelse af materialet – og det var en ’eye opener’ hvor vigtigt det var, at have ejerskab til dokumentationen.

- Har det betydet noget for jeres forhold til rådgiverne – og rådgiverne rolle i projektet?

Vores styrkeforhold mellem rådgiver og bygherre, er væsentlig anderledes end den ellers har været i Banedanmark og eksempelvis vejdirektoratet. Udover at vi har sikret os kontrollen over dokumentstyringen, så involvere vi os også i langs højere grad i projekterings delen for selv at træffe de beslutninger der skal tages, de prioriteringer der skal tages. Vi blander os også langs mere i ressourcestyringen hos konsulenterne. Det vil sige vi blander os i hvad det er for nogle folk de har på opgaven. På den måde har vi i langt højere grad, forestået projekteringen end sædvanligt og det har rådgivningsvirksomhederne generelt været modstandere af, fordi det reducere deres forretningsfase of kontroll. Men der har været forskel på, hvor meget modstand de har gjort.

- Hvad har det krævet af jer som organisation, at kunne overtage den kontrol?

Det har krævet, at vi har været nødt til at udvide vores egen organisation. Det var oprindeligt tanken, at byggeherre organisationen skulle bestå af 20 ansatte og vores byggeherre organisation er i dag 50, så der er en del af de funktioner som var forudsat outsources til rådgiverne, som vi selv har taget – især de nøglepositioner – herunder omtalte CAD funktion, som er HELT nyt i Banedanmark.

- Som økonomi chef, ser du så på det initiativ, at i har ansat flere nye medarbejdere?

Det er ikke dyrene, at ansætte medarbejdere, end at have rådgivere. Det er et spørgsmål om mixet mellem rådgivere og ansatte. Prisen er stort set den samme om man har rådgivere eller ansatte, så i forhold til omkostningsforbrug har det ingen konsekvenser.
• Kan i nu se resultatet af jeres organisationsudvidelse?


Jeg kan se på nogle af jeres indledende analyse data, at der i trafikstyrelsen er blevet udarbejdet et budget der i dets form, er inspireret af Bent Flyvbjerg – ifølge kilder fra trafikministeriet – er du enig i det.

Nej det har ikke referencer til Bent Flyvbjerg, der er udarbejdet på grundlag af en styringsmodel, som er lavet i transportministeriet til store anlægsprojekter. Der kan være paralleller, hvor der kan tænkes på Bent Flyvbjerg, men Flyvbjerg har en langt mere – han har faktisk ikke nogen anvisning på hvordan man skal budgetterne, han er mere en kritik af den måde man traditionelt har budgetteret på, men kan giver ikke nogen afvisning på hvordan man skal gøre i praksis. Han har en meget overordnet tilgang og ikke særlig operationel tilgang.

• Hvad vi du mene omkring han begrebet om human bias?

Ja der er ingen tvivl om, at han har ret i det han kalder bayers of optimism, og det er i høj grad drevet af det politiske niveau, at man har ønsket at gennemføre nogle projekter og så har man presset en underbudgettering. Den politiske proces, og det skete også med København-Ringsted, bliver der ofte forestået en revision af budgetterne og om der er sket ændringer i den fysik som skal bygges, det ser man overalt – det har han ret i.

Vores tilgang er, eller min tilgang er, at man i stedet skal sikre et stærkt budget spor og en struktureret indsamling af erfaringsdata fra tilsvarende projekter, så man sikre sig et sport.
• Hvad mener du når du siger budget spor?

At man kan se sammenhænge, dels at fysikken er veldefineret og dels at de forudsætninger som ligger til grund for de enhedspriser som man har anvendt er gennemsigtige og at der er klare retningslinjer for, hvordan man udmåler reserver. Nemlig at man synliggør reserverne og ikke indarbejder det i en detaljeret fysik, så man hele tiden kan se, hvad var en rå fysikpris og hvad var reserver og så rapportere op i forhold til det og ændre procedure i forhold til det. Hvis man gør det, så er det ikke vanskeligt, at få opdateret prognoserne for, hvad der kommer til, at koste. Den usikkerhed som man har set på nogle store projekter, der er helt overflødtigt, man kan sagtens på en langt store budgetsikkerhed i løbet af projektet, end for eksempel på DR Byen og andre projektet.

Simpelthen ved at have nogle synlige budgetspør og stærk budget styring.

• Stiller i fra starten af nogle rammer til hvornår og hvordan der må ændres i budget sporet?

Det afgørende er jo at man ved hvilke forudsætninger der arbejdet ud fra. Man skal tænke i, at et budget skal bruges til forskellige ting, afhængigt af hvor langt man er i en beslutningsproces. Budget er i virkeligheden et dårligt ord, fordi budget betyder så mange forskellige ting. Et budget kan bruges til, at estimere et givnet projekt kommer til at koste. Det kan også være en bevilling, altså en måde at bevillige midler på. Og det kan være et beslutningsmiddel og der er derfor voldsomt afhængigt af hvad man skal bruge det til. Hvordan et budget skal udarbejdes. I den fase hvor man anvender anlægsloven, har budgettet sådan sat kun et forhold og det er at vurdere om projektet skal gennemføres og så kan der være forskellige alternativer til projektet. I vores tilfælde var der to alternativer, det første alternativ var at banen skulle bygges over Roskilde eller over Ringsted og da skal budgettet eller estimatet bruge til, at beregne den samfundsmandebelig nytteværdi af de to projekter sammenholdt med deres kostpris. Det er det ene, at budgettet skal bruges til i programfasen, derudover skal man bruge det til, at prioritere i forhold til andre anlægsprojekter og det gør man ved at estimere forventet afkast af projektet. Og det gør man ved. En samfundsmandebelig investering skal mindsk give 5 % I afkast, men hvis man har flere projekter, som man gerne vil gennemgøre på samme tid, som begge har over 5 % så skal man prioritere hvilket der skal komme først. Og det er det man skal bruge
estimatetet til, i programfasen. Da er det sådant ikke så afgørende at man har de rigtige estimater, men mere et redskab til prioritering.

At der er en vis usikkerhed, det er sådan set ikke så problematisk, når man så skal til at bygge så handler det om at bygge billigst muligt og ikke andet end hvad der er blevet besluttet. At man ikke pludselig bygger det smartere fordi man har mange penge til rådighed og udvider functionaliteten på den ene side og på den anden side at man gør det billigst muligt. Altså indgår gode kontrakter og får de designet rigtigt.

Her er budget sporet helt afgørende, fordi det er her du kan se sammenhæng til forudsætningerne. Det vi sige du skal hele tiden følge forudsætningerne og det kan være at den linjeføring man har forestillet sig ikke kan lade sig gøre, fordi man skal tage hensyn til nogle naboer eller fordi der er en forurening undervejs, og man derfor må lægge banen i en anden linjeføring, end oprindeligt planlagt. Det vil typisk have nogle udgiftsmæssige konsekvenser. Det kan også give anledning til, at man skal lave nogle nye forudsætninger. Hvis den områdelige løsning ikke fungere, så må har man måske to eller tre alternative løsninger. Eksempelvis har vi gjort meget ud af, at vurdere alternative løsninger af krydsningen af motor ring 4. som princippet kunne være både en højbro, landskabsbro eller en decideret tunnel under motorvejen og da sammenholdt vi økonomien ved de forskellige alternativ samt andre fordele ulemper.

- Og hvordan hentede i viden hertil?

Vi var ude og kigge på andre projektet. Undersøgte hvad de havde kostet i andre lande, mest Holland Belgien og Sverige. Og de inspirerede til nogle andre løsningsmuligheder, især de projekter i Holland. Vi har også indhentet priser.

- Når vi taler om, at forudsætningerne ændres undervej – er det så ikke svart at forudsætte den nødvendige homogenitet?

Et projekt som vores har ikke svært ved, at opnå homogenitet. Det ville være langt svare, for et projekt som operaen. Vi byger bare en jernbane, det er gjort mange gange og er sådan set ikke så svært at
kalkulere. Hvis man har nogle valide reference data, det har så været svært at skaffe fordi man tidligere ikke har gjort så meget ud af reference data, men hvis man er god til at indsamle reference data er det sådan set ikke så svært at budgettere. Omvendt skal man vide, at der er stor usikkerhed omkring hvad sådan noget koster, fordi markedet ændrede sig og det har naturligvis stor betydning for, om anlægsorganisationen har succes med planlægningen. Altså man kan begå rigtig store fejl, som koster rigtig mange penge. Jeg vil hævde at for et projekt som vores, der er estimeret til, at koste 10 mia, da vil et dårligt budget forløb få det til at koste 12 og et rigtig godt budget forløb få det til at koste 8 mia. så den måde man gør det på har enorm betydning

- Men et godt projektforsk - hvad indebær det?

Det er enormt kritisk, at man har nogen der har forstand på at bygge sådan et projekt. Vi har jo måtte konstatere at der er stor forskel på værdien af forskellige konsulenter. Nogle konsulenter koster os en forfærdeligt masse penge, fordi de ikke giver os ordentlige råd og information. De normer og muligheder der er, udfordrede de heller ikke. Et eksempel er det man kalder fritrumsprofil, som er højde og bredde af den kasse som toget skal igennem og det er ikke helt objektivt hvordan et fritrumsprofil skal være. Det har betydning for broer, hvor store de skal være. Så hvis man kan reducere højden på et fritrumsprofil, kan man naturligvis også reducere prise for at bygge den tunnel. Normerne i Danmark er ikke særlig præcis om hvor høj sådan en tunnel skal være, herunder hvor meget kørestrøm fylder i højden. Vi har ikke fulgt de normer, men reduceret højden med 70-80 % i forhold til de standarder der var. Da havde vi klart rådgivere der enten ikke evnede, eller ønskede, at udfordrede normerne for fritrumsprofil, selvom vi bad dem om det.

Selvom dette arbejde tog lang til, har det sparet os for en masse penge. Mange rådgivere tænker meget traditionelt.

- Kan man bebrejde dem for det – de bliver vel 'kun' betalt for en løsning?

De bliver betalt for hvor meget tid de bruger, det vil sige, jo dårlige de er til, at løse problemet – jo mere tid går der. Så det har meget lidt incitament til at gøre det bedre. Der er endvidere meget fokus
på timepriser. Da har vi taget fejl i vores udbud, der var alt for meget fokus på timepriser, i stedet for kvaliteten af det udførte arbejde.

Med de rigtige folk, kan man både gøre det smartere, bedre og meget hurtigere. De rigtige folk de har måske en produktivitet der er 5 gange højere, end andre. Nogen har så slet ikke nogen produktivitet overhovedet.

Et projekt som vores, da vil man formentlig kunne øge produktiviteten hvis man havde de helt rigtige folk og så reducerede med 50 %, så kunne man stadig opnå mere produktivitet.

Rådgiverne har været vandt til, at have meget fokus på timer i stedet for produktivitet og kvalitet. Og dels vil de gerne have uddannet unge ingeniører gennem et projekt som vores. Det vil sige at vi bliver påduttet en masse uerfarne ingeniører og det har vi måtte kæmpe en del med. Det er ikke fordi at vi ikke vil have unge ingeniører, de kan være rigtig dygtige. Omkring frirums profil var det en kinesisk studerende der reelt fandt løsningen, så hvad en masse rådgivere ikke var i stand til, det gjorde han ved bare at tænke sig om.

- I har taget magten og kontrollen tilbage – er der andre opgaver som i nu udføre, som rådgiverne tidligere har varetaget?

Projekteringsopgaver, har i høj grad været egne folk. Vi har en gammel anlægschef fra vejdirektoratet på 76 og han ved alt om hvordan man bygger broer og laver linjeføring. Han har i høj grad erstattet rådgiverne. De gør faktisk til han med spørgsmål. Han kan sagtens erstatte 10 rådgivere fordi, han har så meget viden.

I det hele taget det med infrastruktur. CAD er jo en del, dokument styring er en anden del og forretningsgang og processor er en anden del. Det afgørende punkt er, at man besidder infrastrukturen. Det er kernepunktet i forhold til produktivitet.

Det er derfor et problem, at anlægsmyndighederne ikke har forstået vigtigheden heraf, men i stedet overladt det til rådgiverne og fuldstændigt afgivet projektledelsen. Det har vi forstået fra starten.

Jeg tror at nogle projekter kunne effektivisere med noget der ligner 50 %, hvis de havde ordentlig projektledelse. De ville eksempelvis mindske overflødige aktiviteter. Rådgiverne elsker eksempelvis, at lave bygherre overslag, det vil sige overslag på hvad entreprenørarbejdet kommer til at koste. Det
har vi sagt, at det er vi overhovedet ikke interesseret i. vi venter bare til at se hvad entreprenørerne tilbyder – det skal jo bygges under alle omstændigheder. Tilsvarende vil de også gøre tegningerne mere detaljeret end hvad vi har behov for, dvs. et mere detaljeret målestok forhold. Rådgiverne har jo ikke noget incitament til, at reducere deres ressource forbrug.

- Hvem rapportere i tilbage til?

Vi rapporterer til Danedanmark, trafikministeriet slet ikke. Vi har fået en pose penge og nogle regler og normer som vi skal overholde, både danske og EU udstedte. Derudover skal vi bare udføre den projektbeskrivelse som vi har fået udstedt.

- Så, så længe i bevæger jer inden for de rammer, kan i bevæge jer ret frit?

Ja det må man sige.

- Jeg havde troet, at projekt ejerne ville holde mere øje med projektforløbet?

Transportministeriet spørger forbavsende lidt til forløbet, Banedanmarks direktion rapportere vi naturligvis tilbage til. Transport ministeriet har slet ikke forudsætningerne for, at styre den slags projekter.

- Er det ikke et problem, når vi netop tidligere i vores samtale fik slået fast, at mange projekter videregav projektledelsen til rådgiverne?

Jo, men mange projekter er jo også gået galt.

- Hvorfor var det, at man valgte ikke, at bibeholde den gamle banestrækning over Roskilde?

Fordi den ikke kunne tilbyde nok kapacitet, vi havde behov for en 3 sporet bane. Når Femern forbindelsen kommer, vil der komme betragteligt mere godsforbindelse igennem Scandinavien, så det var
en forudsætning der var udslagsgivende. Egentlig var det rent politik, alt talte for, at den skulle køre over Ringsted, men der var en tidligere aamtsrådsmedlem der meget gerne ville have det over Roskilde og han var sådan set den eneste årsag til, at man ikke besluttede sig tidligere. På den måde var det ikke fornuft argumenter, det var ren politik. Så han var en dyr mand, jeg tror man kunne have sparet ca. 100 mio. i analyse.

- Bliver der brugt mange ressourcer på analyser i indledende faser

Der er ingen tvivl om, at man på København-Ringsted har brugt alt for mange ressourcer på at træffe beslutninger – Det kunne sagtens have været gjort for en tiende del.

8.5.1. Interview 2, Banedanmark's Financial Manager

- Hvordan fungere nyanlægsbudgettering i praksis?

'Ny alægsbudgettering’ operer med, at man har 5 faser for et projekt. En ide fase, program fase, udførelses fase og ibrugtagning. Den første fase, altså ide fase, bruges til an screene det her projekt. Hvilke fordele har det, hvordan hænger det sammen med de, øvrige trafik investeringer vi har her i Danmark og sådan set også det øvrige EU. Overordnede trafik korridorer, især sammen med Femern forbindelsen som hænger sammen med de øvrige trafik korridorer i Europa. I ide fase, det er således det første bud på projektets formål og hvad det kommer til at koste, dets tidsforløb og hvornår det er relevant. Når Der kommer et go fra ide fasen kommer det over i program fasen.

- Inden vi gør videre med program fasen vil jeg gerne spørge nærmere til ide fase -Så vidt jeg kan forstå er projektet diskuteret gennem 20 år, inden det trådte ud af ide fasen?

• Var det en del af en politisk proces, eller fordi man ikke troede på projektet eller noget helt tredje?

Det var en del af en politisk proces, men det er også en del af om casen er god når. Der foretages en politisk vurdering af om casen er relevant. Det besluttes politisk om en given ide skal gå fra ide fase til program fasen.

• Hvad havde i lagt fast i første ide fase?

I første ide fase havde vi for eksempel ikke lagt Femern fast. Det gør man først... Nej nu bliver jeg tvivl om hvornår det var. Den oprindelige tanke var, at det skulle være en bane over Roskilde og så på et tidspunkt 1990'erne så kommer muligheden op med en linjeføring over Køge, men det vil jan vores projektleder kunne svare nærmere på.

Den nye bane er der så politisk uenighed om. Så derfor vælger man i programfasen, at afprøve to muligheder. Nemlig at udbygge banen over Roskilde eller bygge en helt ny over Køge. Det er der en masse. Politik i, fordi er der nogle Roskilde politikkere som gerne vil have den over Roskilde.

Alle der for alvor kender til det her område, de ved godt at Roskilde ideen er syg. Derfor er der ingen der tror på den blandt fagfolk. Men man gennemførte de to analyser i programfasen, det viser som forventeligt at vi skal bygge en helt ny bane. Det vil sige at den samfundsøkonomiske analyse viser, det bedste afkast ved at lave en ny bane. Dette resultat hænger tæt sammen med planerne om at lave Femern forbindelsen. Fordi at udvidelsen over Roskilde giver ikke tilstrækkelig kapacitet til at kunne dække behovet. Med Femern vil der være så meget trafik gennem Danmark, fra Sverige, Norge og Finland til Tyskland.


• Så vidt jeg forstod på jeres CAD manager hvad i nogle områder som bevis ikke blev afdækket i forundersøgelsen?
Der er en masse praktisk ting og anlægstekniske ting, som der ikke blev afprøvet. Fordi det er der ingen grund til, det er ingen betydning for beslutningen. Programfasen fastlægger kun nogle rammer. Økonomiske rammer, Miljø rammer, linjeføringsmæssige rammer og kvalitet og kapacitets rammer. De rammer bliver overdraget til design fasen, som bestemmer hvordan banen skal bygges. Det vil sige der er en masse design teknisk som endnu ikke er besluttet.

- Er det først i design fasen, at Banedanmark overtager projektet eller er det først i program fase?

Dengang da dette projekt blev planlagt på programfasen i trafik styrelsen og design fasen hos Banedanmark. Siden er det blevet ændret og anlægsudvikling er blevet flyttet fra trafik styrelsen til Banedanmark. Hvad angår design fasen, har vi i Banedanmark opbygget en helt ny projektorganisation. Fordi projektet er så stort.

Det er evident, at forudsætningerne strammes til i der her forløb. Det er alledræd besluttet i programfasen, hvordan projektet skal strammes til. Der er regler og normer for hvad der skal ligge fast i program fasen og hvad er stadigt åbent.

Det er en væsentlig diskussion hvornår og hvordan man skal stramme forudsætningerne.

Du kan jo ikke have forudsætningerne åbne hele vejen, for så kan vi ikke styre entreprenørerne. Det planlægger vores CAD manager i design fasen. Nogle gange efterlader vi det også til entreprenørerne, at planlægge designet. Det sker når vi udbyder en totalt entreprise.


Mange overvurdere hvor omskifteligt et projekt forløb skal være.

- Vil du derfor vurdere, at projektet er homogent i forhold til andre projekter?

Ja, meget langt stykke hen ad vejen er København – Ringsted projektet et homogent projekt i forhold til andre projekter.
8.6.1 Interview 1, Banedanmarks Projekt Director

- Jeg kan forstå, at der er nogle normer og krav, som man skal overholde når man gennemføre en projekt som København – Ringsted?

Ja, altå hvis vi starter helt grundlæggende: det man kan sige om et hvert projekt det er, at det er noget som er generisk gældende. Normer og standarder, dvs. noget som ikke bliver fastsat for den specifikke case, men noget som altid er gældende. At når du bygger et problem så skal du have de og de spor profil, dæmningsbreder – altå alle sådan nogle almindelige standarder for, hvad er det som er almindeligt for og gældende når man bygger jernbaner.

Så er der den anden gren so, om udtrykker det specifikke anlæg man bygger. Altså skal det være enkelt at dobbelt sporet, hvad er det for en hastighed man køre efter, hvor skal jernbanen ligge, hvad er det for nogle veje der skære – går de over eller under og så videre. Det bliver dokumenteret som grundlag for anlægslovet. Den første det er sådan noget bane verdenen selv fungere.

- Når du siger bane verdenen er det så trafik styrelsen du mener?


Så er der den specifikke det. Det vil sige hvad er det i virkeligheden vi skal bygge. Det bliver, i Danmark, fastsat typisk ved hjælp af en anlægslov. Det er ligger i anlægsloven er for det første, at man fremsætter sådan en lov, til en første anden og tredje behandling. Når den bliver fremsat er det med bemærkning hvor transport ministeren indsætter bemærkninger hvor han i virkeligheden begrundes at loven har de og de effekter. Derefter har man en lov, som i virkeligheden kun er nogle paragraffer, men loven som fremsat og de intentioner der ligger bagved, de er også retningsgivende for det projekt som vi har. Og det som blandt andet ligger til grundt, det er en miljø redegørelse som har været fremsat i offentlig høring. Det vil sige der har været skabt en offentlig forventning Hos borgerne langs ved strekningerne – hvad er det vi kommer og bygger – hvornår kommer vi og gør det – og hvilke impacts forventer vi at det vil have.
• I den forbindelse, gør i jer der nogle antagelser?


• Hvad hvis der fx er et sted hvor i ikke har lavet flagremus kasser, men det viser sig, at der er flagremus i området?

*Hvis der er nogle favremus. Ledninger eller andet som vi ikke har identificeret, så må vi naturligvis lave et projekt for det.* Om man tror det er indenfor eller udenfor de retningslinjer som ligger i miljøredegørelsen. Hvis vi for eksempel hæver en vej 2.-3 meter og de ikke er en nabo ekstremt tæt på, så klare mand et sådan set bare ved, en altså projekt ændring. Det udbreder ikke mere støj eller visuel ændring og sådan nogle ting. Men vi har for eksempel et sted nede ved ringsted, hvor vi skulle lave to erstatnings broer, hvor ringsged kommune i stedet foretrak at vi lavede en vej og kun en bro. Af forskellige lokale årsager. Og det er så foranderligt, end det projekt som har været fremsat i offentlig høring, at det er man nødt til, at lave et nyt projekt omkring.

• Så sådanne episoder, betragter i nærmest som et helt nyt projekt i projektet?

*Ja det kan du godt sige. Det gør du faktisk, vi betragter dem som en nyt projekt og gennemføre det fra ide faseen.* Normal så gør man – ja det ved jeg ikke om vores økonomi chef har fortalt dig, men han er jo verdens mester i det her med fase forløbet, han har lavet alt det der med ny anlægsbudgettering i sin tid.

• Ja det har vi talt lidt om.

*Haha, ja jeg kan godt huske at jeg var oppe ad skænnes med han dengang, om det var rigtigt eller forkert. Det var meget skægt. Men det var jo dengang han var hos Capacent.*
Men altså et projekt det lever jo i en definitions fase hvor man gør de første antagelser. Det er typisk noget som er vendt mod selskabet som laver projekt overslag og så videre. Det så en slags. Der kan også være offentlighed inddragelse hvor det er et væsentlig projekt. Det er det som hedder strategisk miljø vurdering, det er man nemlig også pålagt at lave. Og det er ikke en miljø redegørelse, det er på det som hedder idefase niveau. Her talte vi om, skal jernbanen gå den vej eller den vej? Sådan nogle helt, helt overordnede miljø betragtninger, det kan man godt have med i en strategisk miljø vurdering.

• Men det, at du kalder den strategisk, så er den vel ikke så fastlagt som eksempelvis miljø vurderingen?


Så den strategisk miljøvurdering det er sådan en slags lancering af projektet i idefasen, i offentligheden. Og det kræver også en form for høring. Så allerede i idefasen kommer der faktisk feedback fra offentligheden. Derfra træffer politikkerne beslutning om, at få videre til næste fase og det er så det, at det begynder at blive alvor. Og så blæver projektet mere og mere sandsynligt som man kommer frem i fasen. Og så i det der hedder programfasen, som er det næste trin. Så detaljerer man det til det som hedder en projekt forslag. Det vil sige du har tegninger i 1:1000 hvor det er fastlagt relativt precist hvordan projektet skal gøres, og så laver man den her miajordredegørelse oveni. Det grundlag er faktisk så precist, at hvis det er lavet rigtigt, så kan du faktisk bygge det indenfor den baggrund.

• Med hensyn til jeres plan, set i forhold til det du ved i dag, vil du så mene, at det er tilfældet for jeres projekt?


På København – Ringsted var der det specielle, at en del af kommunerne langs med strækningen var i oposition til projektet og banede det hend hvor peperet gror og ville i virkeligheden hellere have en 5 sports løsning. Så da var det ikke muligt, at komme i en egentlig dialog om hvordan projektet skulle se ud, fordi de have brugt alt deres energi på at bekrige det. Det betyder at vi nu på et senere tidspunkt, hvor vi nu har kommune samarbejdet. Så har sagt "lad os prøve at se om vi kan lave optimeeringerne her". Det har først til ændringer af nogle vejanlæg og så videre.
Det var naturligvis nogle kommuner som var interesseret i, projektet fra start. Køge var især store medløbere, men vallensbæk og Ishøj, greve og Solrød det var indæde modstandere og ville helre bruge energien på noget andet. Jeg vil så tilgengæld sige, at efter projektet er blevet besluttet så har vi udmerket samarbejde og det køre rigtig fint. Så det skal ikke bebrejdes kommunerne, det var jo bare et strategisk valg, at de valgte at gøre sådan.

- Den 5 sporsløsning som du refererer til, hvorfor blev den løsning ikke valgt?

Jamen altså resultatet af en strategisk miljø vurdering kunne eksempelvis være, at man have 5 forskellige løsninger – altså nogle forskellige trafikale alternativer der skulle løse det større formål. Så vil det faktisk mest være normen, at man vælger en løsning og så føre den videre i en offentlig høring. Men politikerne kunne ikke blive enige om, hvor vidt det skulle være en 5 spors løsning eller en helt ny løsning, så derfor røg begge løsninger med. Og det er i virkeligheden, sådan at de to projekter er storebroer og lillebroer i den forstand at 5 spors løsningen er et projekt til ¼ eller 17% af hvad det nye bane koster. Men den kan så heller ikke det samme, så det var et spørgsmål om, hvor meget ville politikerne investere i, at fremtidssikre jernbanen. Det var så den politiske beslutning som blev truffet ud fra en samfunds økonomisk beslutning – det tror jeg du kan huske jeg har fortalt om tidligere ellers har jeg sendt til rapporten. Det betyder at politikerne altid treffer beslutning om det projekt som bedst kan betale sig, men det er en af indikatorerne for hvad der er bedst. I rapporten sås, at nybygningsløsningen klar var bedst. Den giver det bedste afkast for den investerede krone. Men det var en rendyrket politisk beslutning, alternative var lagt ligeværdigt op til beslutning.

- Hvad gjorde at netop de to løsninger kom så langt? Jeg kan forstå, at idefasen har været alen lang og mange ideer har været på tegnebrættet?


Hvorfor man to netop endte med de to løsninger? Altså de andre løsninger som var tilbage, altså ud over de to løsninger som vi endte med. Det var den fulde udbygning, men det kunne folketinge ikke blive enige om at det skulle man og det lå ligesom i kortene efter at trafik styrelsen havde lavet en strategi analyse i midten af ørnerne i 2005 at den var der stadig ikke nogen der talte på det om. Man kunne huske at den var strandet før, og det var man bange for ville ske igen. Så forsøgte man sig med
S toget til Roskilde, det var i øvrigt et super godt projekt, men det var en lillebror i forhold til den store samemnhæng. Den var 1/10 del af omkostningerne til den nye bane. Det trandede en del på bland andet fordi S togene skulle ud og køre på fjernnettet og andre tekniske detaljer som var udslags givende. DSB var ikke meget for det, det strandede også pga. polomik, lad os sige det på den måde.

Jo så var der en sidste løsning som de kaldte kombinations løsningen. Den forvandt faktisk de to største miljø problemer. Støjen hos vestejnens borgere og så miljø problemet ved at køre ned gennem området, men den fik heller ikke nogen støtterne.

Og så var det tilbage 5 spors løsningen og den nye bane tilbage. Man kan næsten kalde det et udskildelsesløb.

Det kunne være faldet ud til mange sider. Det afhænger af mange faktorer, eksempelvis hvem der er transport minister i den pågældende periode.

- Hvis jeg må spørge kritisk, så man jeg ikke undgå at kommentere på dette. Du har tidligere nævnt at når løsningen først lægger fast så er den hvid udstrækning fastlagt. Er det så ikke tankevækkende at så mange andre løsninger kunne have været blevet vedtaget?

Det er jo fordi det øjeblik man laver en anlægslov, så lægger det fast. Så begynder det store maskineri for alvor. Det der har været brugt til at undersøge København Ringsted inden anlægsloven blev lavet – det er jo blevet undersøgt på mange gange, at hvis du lægger det hele sammen er det måske 500 mio kroner der er blevet brugt på forundersøgelse og analyser. Den 1/3 som er gået til nybygningsløsningen er jo ikke levet spildt fordi det er jo det, der er bygget videre på. Så man kan sige, at det har kostet en kvart milliard i analyser, at man ikke har kunne blive enige. Men man skal jo på den anden side også undersøge nogle forskellige alternativer for, at komme end til hvilken løsning man skal udføre.

Når man så er blevet enige om, eller samlet politisk flertal for, at nu er det nybygningsløsningen vi laver, og vi går i gang med at bemande den organisation vi har nu, budgettere og lave udbudsmateri- aler og sætte entreprenører i gang, så er det klart, at det har kolosale konsekvenser hvis projektet bliver stoppet. Så er det jo rigtig rigtig mange penge at samfundet vil tabe hvis det skulle ske. Så altså hvis vi forssætter med at gøre det godt – så bliver banen også færdig, ingen tvivl om det. Men tilgen- gæld hvis vi fucker det op og bruger en masse penge som ikke er vores, så er det naturligvis en anden situationen. Mend et regner jeg nu ikke med som det ser ud.

- Er det du politikkerne som i stor til regnskab overfor?

Ja det er opdragsgiver for os.
Er det så også derfor, at sætte nogle rammer? – når i på den måde påtager jer at udføre opgaven for nogle andre "politikkerne"


Hvis du ser på Sverige og Tyskland for eksempel så har de en helt andet proces. De har ikke en anlægslov, så når man beslutter sig for et projekt, så skal det også igennem en lokal beslutningsproces. Femern forbindelsen for eksempel skal forelægges for kommunal myndighed i Slesvig – Holsten. Det er sådan en slags bygge tilladelse. Og det er altså lokalt der sidder nogle administratorer og det blander staten sig sådan set ikke i. Det er altså forskelligt hvordan man gør det i Danmark i forhold til hvordan det gøres i andre lande.

Men vi er meget glade for at lave en anlægslov, for der er de politiske forventninger så, at sige relativt firkantet skåret ud i pap. Det vil sige så længe vi opererer indenfor de rammebetingelser, så er projektet på rette vej. I det øjeblik vi falder udenfor hvad end det er noget teknisk eller økonomisk, så skal vi naturligvis spørge til råds om det er en fornuftig vej at gå.

Vi har faktisk en sag som er gået ud af den tangent. Det er et nyt anlæg nede i Ringsted. Det var det oprindeligt meningen, at lave et helt simpelt anlæg som bare skulle tilsluttes, men nu skal der laves et helt hvor man kan køre 200 km i timen er der skal laves det vi kalder en fly over, altså hvor sporene går over og under hinanden. Det er en så stor ændring at det skal have sin egen miljørededgørelse og så stor en ændring at folketinget er nødt til at vedtage en ændring af anlægsloven. Så da skal man altså op og trykke på nogle knapper og fortælle, at det ser altså ikke sådan ud, men sådan ud.

Anlægsloven er god, fordi når vi så går ud til interessenter, det kan være indenfor miljø, kultur arv eller kommuner, så ved de godt at der er en anlægslov og det forpligter dem til at følge projektet til dørs på en fornuftig måde. De kan ikke bare bremse opgaven. Eller hvad man skal sige, fordi der i virkeligheden er nogle paragraffer i anlægtloven som i virkeligheden gør os til myndighed.

Så det har gjort jeres proces mere effektiv?

Ja set fra anlægs myndighedernes stol der er en anlægslov klart med til at gøre et projekt mere effektiv.
• Den lukker ikke muligheden for nogle afstikkere?

Nej det syntes jeg ikke den gør. Altså igen vi forsøger jo i virkeligheden at have business as usual ved at vi inddrager kultur arv og div. Miljø myndigheder i processen. Men et betyder bare meget, at man ikke diskutere den konkrete løsning, men det i virkeligheden mere er en forfining af løsning end det er grundlæggende ting.

Det man i øvrigt kan sige til det, at have en anlægs lov det er, at det gør rapporteringen enklere. På den måde, at meget af det vi laver er ændrings styring. Projektet kan blive bevaret i et tetknisk miljø og bliver ikke udsat for politiske angreb under processen. Altså det er klart at meget store projekter som storebælt og femern, at selvom de også køre i et teknisk miljø godt kan have nogle politiske afstikkere. Men hvis du kigger på storebælt så var det begrundet i , at der var mange problemer dernede. At projektet blev forlænget of prisen blev dyrere. Derimod Øresundsprojektet gik rigtig godt, det blev færdigt før tid og det blev billigere end man havde budgetteret. Det betød også, at det projekt hørte man i virkeligheden ikke ret meget til. Det fik i virkeligheden lov til, at bygge sig selv. De der var involveret i det, de bryste sig stadig af det den dag i dag. Det var mange af de folk der kom fra storebælt og de har så fået lærin.

Hvis jeg lige må grave lidt i begrebet læring og fleksibilitet - Jeg kan forstå på jeres CAD manager, Gita, at jeres CAD funktion ikke var budgetteret fra starten af og endnu ikke ved om det vil tjene sig hjem?

Ja firkantet skåret ud er det rigtigt, om så stringent er budgettet ikke. Vi har et baseline og i de budget er der en række underpunkter, fx det vi bruger på design og budgetering. Der er der nogle steder lavet en specifikations, men typisk er der sat en procesdel af anlægssummen af. Det betyder, at hvis vi kan se, at et initiativ kan opnå en besparelse eller minimere nogle usikkerheder, så kan vi sådannet gøre det hvis det kan gøres indenfor budget rammen.

Vores forberedelse er derfor blevet lidt dyrere end forventet, men fordi vi forventer en side gevinst, så vil det tjene sig hjem i udførelsen.

Det er jo en strategisk beslutning, at vi forsøger at flytte nogle beslutninger ind på skrivebordet i stedet for, først at opdage nogle komplikationer under udførelsen. Det var vi i ledelses kredsen enige om.

Jeg kunne se i jeres baggrunds materiale at i har haft en lignende strategi i programfasen – da var i ude og se på nogle lignende projekter?

Vi har lavet benckmarks. Da sagde vi ”Det kan godt være at det er første gang at vi i Danmark bygger en højhastighedsbane der kan køre 250 km/h men det er i særdeleshed ikke første gang i Europa”. Det bliver jo bygget i mange lande, også baner som er hurtigere. Så har vi generelt en ide om, at vi køber de produkter som findes til den slag anlæg. Vi er ikke interesseret i at udvikle nogle særlige
danske standarder. Vi ved at teknologien finder, så det er sådan set bare et spørgsmål om at finde den bedste kvalitet til den bedste pris.

Det der derfor har været mest vanskeligt, det var i virkeligheden, at pris sætte projektet. For når man ikke laver 100 af den slags projektet. Hvordan skal man så regne ud hvad det koster at lave sådan en u bane. Hvis det man er fandt til er at lave 3 meter bane eller lave lidt forbedringer på det eksisterende. Så skal vi nu lave det i store skala, så ved man godt fra economics og scale, at hvis man pakker der her ind i nogle fornuftige størrelser så får du nogle enhedspriser der er gunstige. Økonomi chefen og jeg er enige om, at de fleste økonomer siger at den flader ud på et tidspunkt, så meget vi at den i virkeligheden vender på et tidspunkt. På et andet tidspunkt så bliver tingene så store at det i virkeligheden bliver en ulempe. Så har været vores indledende øvelse, det er at lægge os på et stadie som vi forventer er optimum. Altså hvor store skal de forskellige udbud være, skal det være kontrakt størrelser på 0,5 mia eller 200 tusinde og det har vi sådan set rejst lidt rundt og kigget på hvad gør man i andre lande. Her endte vi med at være meget inspireret af lande som Sverige og Holland. De deler entrepriserne meget op.

Det er vigtigt for os, at dele entrepriserne op. Så hver enkelt kan se hvad de er ansvarlig for og overskue det. Det har vi hængt op omkring en række projekt chefen som er ansvarlig for eget geografiske område. Det betyder, at ham der arbejde i Hvidovre ikke behøver hvad der foregår i bjæverskov. Det betyder ikke at de ikke kan spise frokost sammen hvor de deler lidt viden ala “nu skal du høre hvordan jeg blev taget ved næste”. Det er for, at undgå at han i sin dagligdag ikke er kastet ud over hele projektet, men i stedet får tildelt en overkommelig ansvarsdel. Det er der vi tror optimum ligger, det ligger der hvor man kan gøre arbejdsopgaven begribelig.

- I opstarts fasen gjorde i jer der nogle antagelser?
Ja købehavn ringsted projektet er i virkeligheden planlagt efter det der hedder buttom up principippet. Da sagde vi simpelthen: baseret på de erfaringsspriser som vi kender fra andre projekter så vi københavn ringsted komme til at koste x. derefter havde vi statens byggeforsknings institut inde hos os, for at undersøge, hvad economics of scale betyder. Altså den stordrift fordel vi opnår, grundet vores størrelse.


Men i programfasen gjorde vi det for, at afdække hvor vidt der var nogle områder som vi særligt skulle tage stilling til.

Man må jo sige, at som anlægsmyndighed var det ideelt, hvis man kunne konsolidere et budget allerede i starten. Bare sige 40 – 80 millioner så skal bi nok bygge det, den det bliver måske 13 og så

Et succesfuldt projektforløb er i virkeligheden et forløb hvor man har været i stand til at forudsige det og derefter lave ændrings styring og sporbare beslutninger. Og uanset, som jeg sagde i programfasen, da der var kritiske ryster der sagde at det kan aldrig bygges for 10 mia. nogen sagde at det ville koste både 12 og 15 mia. da sagde jeg "ja nu har vi altså nu engang arbejdet med det og analyseret på det og fundet ud af at det er det vi tror på – vi kan ikke love at vi kan bygge det til den pris, men vi kan love at vi vil gøre alt hvad vi kan”

Så det er – jo og så skifter sådan et projekt jo liv undervejs. I starten hvor det er meget uklart hvad det er man præcist skal lave. Så er det meget senior ting. Da er det sådan nogen med meget politisk fokus og vendt mod officielheden. Når det så kommer ind i selve designfasen, så bliver det meget ingenior tungt og man skal sørge for at alting bliver koordineret og rammebetingelserne skal lægges fast. Når mans så har indgået kontrakten, så bliver det meget, sådan byggestyrings agtigt. Så skal man have forhandlet en masse, hvor man skal samle op på de ting som ikke gik som forventet og ikke stod i kontrakten. Det er meget forhandlings venligt og styrings vendt. Så projektet gennemliver også et forløb hvor det er forskelligt hvad det er for nogle folk der er brug for og hvem det er vigtige. I dag havde jeg fx en der gerne ville søge et job – hun var forbi bare lige for at snakke med mig om hvad vi lavede. Hun kom fra de tidligere faser, men nu har vi behov for nogle andre profiler.

- Hvordan påvirker den udvikling din rolle som projektchef?


Nogen har det dog bedre med at arbejde i specifikke faser. Eksempelvis rådgivere er meget glade for design og koordinering, men de er typisk ikke særlig gode til at bygge styre. Fordi alle de fejl de har begået i deres eget design det er de interesseret i at dække over. Så da har man typisk nogle andre folk til at se dem efter i krogene.
Hvad mener du med det?

Jeg mener det, at vi jo alle sammen begår fejl undervejs og vi lever ikke i en nulsums fejls kultur. Det gør vi heller ikke i København – Ringsted, men vi kunne godt tænke os at der var fuld åbenhed omkring fejl, så den samme fejl ikke bliver begået en to tre gange. Så det der med at konfontere nogen der har jokket i spinaten og bedt dem om at stille sig om på en sene og fortælle om alle deres fejl. De folk er der ikke... 9 ud af 10 gange vil vi altid give nogen andre skyldes. Vi du derfor sidder med en byggeleder som har siddet med designet, så har det den fordel, at han kender designet, omvendt kan de have den konsekvens at han dækker over egne fejl. Det er vi meget opmærksomme på.

Kan sådanne eksempler have den konsekvens, at hvis man sætter det lidt på spidsen , så kan det at i er sat overfor en anlægslov – at i så af strategisk årsager fejer noget ind under gulvtæppet?


Men jeg vil sige, at den her branche har i de seneste 20 år gennemgået en udvikling i den realistiske retning. Altså de projektet som var kroniske underbudgetteret, som vi hørte om i 90’erne af alle mulige forskellige slagt. Er blevet færre fordi budgetterings processen, objektiviteten og organiseringen er blevet bedre. Og så har man simpelthen fået mere erfaring.

Objektivitet?

Ja, man har jo oprettet trafikstyrelsen, for er en objektiv styrelse som rådgiver politikkerne til, at tøffe beslutningen. Dengang dette projekt blev besluttet var det sådan at trafik styrelsen også forbedrede projektet. Det er i dag flyttet til banedanmark, af forskellige årsager.

Men hele ideen i, at have en styrelse som ikke har bundline ansvaret gør, at politikkerne har et mere objektivts beslutnings grundlag. Sammenlignet med hvis man bad dsb rådgive, beslutningen tagerne. Da de ville se muligheder i at udvide deres forretning.

Det har derfor været en afgørende faktor at sektoren i dag har en objektiv instans.

Lige en sidste ting
Det er sjovt du navner bayers of optimism – mener du at det har eksisteret i jeres projekt? Og videre er optimism udenlukkende noget negativt i dine øjne?

Jeg tror du skal søge den forklaring i psykologien, for der vil altid være nogen som siger at de sagtens kan bygge det for 4 mio og så lever de har, hvor gang man når til et point af no return så fylder de lidt mere på, fordi det på et sådan tidspunkt ikke er muligt at gå tilbage. Da er restriktionerne i systemet i dag, at de det går galt for, de bliver kasseret. Det betyder unægtelig i dag, at man har skabt en historisk funderet skræmme kampagne. Alle kan jo love og forlede nogen til at tro et eller andet, men man kan altid sætte en beslutning til en 3 part. Det Var københavn rinssted også og det gik igennem.

* Vil du så mene at det er været byers of optimism i dette projekt

Nej, ikke i København – Ringsted. Der kan jeg garantere dig for at der ikke har været byers of optimism. Altså der har været – det eneste der har været – altså du kan godt bruge det i speciale spørgmål, men lad være med at sætte det ud i pressen - det er et eller andet med, at politikkerne på et tidspunkt anskueliggjorde at vi have en befatings vilje på 10 mia. det er der nogen der har sagt at vi har været ude i nogle af de øvelser omkring stordrift fordel. Det vi så har valgt at gøre, det er at lægge budgettet frem og fortælle hvad vi har reguleret for og så kunne man jo bare gå ind og sige ” jamen det tror vi ikke på, vi tror på den analyse som trafik styrelsen har lavet – den er velbegrundet og underbygget af statens trafik forsknings institut og benchmarking”. Alt det har der været åbenhed omkring, så den optimism som vi blev beskyldt for, at alle der måtte have bedre argumenter, kunne fremlægge og samt læse vores argumenter. Alt har været frit tilgængeligt.

Jeg vil sige, at de mennesker jeg arbejder sammen med. De er bestemt præget af realisme, hvis der er noget som bliver underbudgetteret så er det meget ofte fordi der er opstået nogle risici man havde glemt eller ikke var klar over. Det vil sige, noget man simpelthen ikke viste, at man ikke viste. Der vil altid være ting vi ikke ved, at vi ikke ved.

Hertil vil jeg sige, at der naturligvis er nogle der er mere grønne end andre og de ved derfor mindre. Men så er deres fejlslutninger er resultat af deres manglende viden og erfaring og ikke fordi de er præget af buyers of optimism.

Derudover kan der naturligvis også være nogle incitament strukturer som gør folk for optimistiske. Vi kan nævne et tænkt eksempel om en kommune som har deres interne agenda og forsøger, at fås staten til, at finansiere dette.

Men hvis sådan noget forekommer i det i givet, fald meget sjældnere end da jeg startede hos banen for 20 år siden. Da var alle processer præget af det jeg kalder mangel tænkning. Der var simpelthen mangel på erfaring og almindelig projektstyring.