Facilitating Value Creation and Delivery in Construction Projects
New Vistas for Design Management

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Abstract
This thesis is about value creation in the early stages of construction design processes. It has been problem-driven with a specific management concept, the workshop model, as an outset. Essentially the question was; how should construction project design processes be managed with the objective of maximizing client and user value? To this end the research project can be seen as an effect of a current management discourse, where customer value is the slogan.

However, in an academic context, such a question needs justification as well as modification to become operational. In relation to justification, the question is highly relevant for a number of reasons. First of all, in Denmark and in many other countries (e.g. the UK and US) substantial critique has been raised regarding the construction industry’s current level of achievement. At first, this led to various development initiatives to improve efficiency and quality. Subsequently, concerns have been raised about value. Accordingly, efforts to improve efficiency and quality may be somewhat wasted, if the ‘wrong’ products are provided.

Nonetheless, the literature is sparse in explaining the notion of value in construction design processes. In addition, the research on construction design management is still in its infancy.

Focusing on the early stages of designing, where the scene is set for everything that follows, this led to the following research questions:

1. How do the client and other project stakeholders’ perceptions of value manifest in conceptual construction project design-processes?
2. What issues can be identified in conceptual construction project design-processes in relation to management of client value creation?
3. What recommendations can be made – on the basis of the theoretical and empirical findings – concerning construction design management in general in relation to the conceptual purpose of client value creation?

In order to answer these questions, literature reviews are provided within the following fields of research: value theory (philosophy and social psychology), theory of designing, communication and group-dynamics theory. In addition, the following instrumental management concepts, which were deemed relevant to the topic, have been outlined: Briefing / architectural programming, value management and value engineering, values-based management, Lean product development and lean construction. Construction project process models/protocols are also addressed.

Next four qualitative case-studies (from Denmark and USA) are presented and analysed by means of a ‘Reflexive methodology’ that pragmatically draws on the meta-theories of hermeneutics, critical theory and postmodernism.

This leads to the synthesis where the following answers (presented here in a condensed form) are provided:

Perceptions’ of value manifest in the local discussions and arguing over design alternatives. Although designers and contractors support the notion of client value, they are not mere problem-solvers; they actively try to influence the design to their own liking. Within a social process, distortion of communication, codified language and rhetoric can be means of persuasion. To provide an overview a Vector model of Influences on Value creation (VIV-model) is developed.

These findings, which relate to the first two descriptive research questions, have implications for management of value. It is argued that the contemporary concepts reviewed mostly ensure that information is available and design tasks are coordinated. They do not address the social processes in local group interaction. It is therefore recommended to stimulate greater awareness about the potential ‘pit-falls’ observed in the case-studies by means of three metaphors for reflection and design-group adjustment. These are: (1) Part-whole conversation, (2) Game of persuasion and (3) Hyper-reality. Reflection and adjustment may require the inclusion of a facilitator. In addition, concrete suggestions for further development of the design management concept, the workshop model, are provided.

In general, the thesis contributes to the emerging literature on construction design management, which is still in its infancy. In addition, the theory part of the thesis contributes with a somewhat philosophical perspective to the topical discussion of value and values in construction management literature. More significantly the thesis describes – by means of four case-studies – how value perceptions manifest in construction design processes. Furthermore various issues in relation to client value-creation are identified in the case-studies. In connection to this, the VIV-model provides a new framework for understanding the link between designing and value-creation. This together with the three metaphors, provide an initial ‘competence-basis’ for a construction design group facilitator. Furthermore, in the instrumental area, the study includes the first scientific and critical examination of the ‘workshop model’. Finally, the thesis introduces an innovative methodology in construction design management research by adopting (and adjusting) the ‘Reflexive methodology’ developed by Alvesson and Skölberg (2000). This approach proved to be practicable in a complex socio-technical analytical context.
Dansk resume

Denne afhandling omhandler værdiskabelse i byggeriets programmerings og projektering faser. Forskningen har været problemorienteret og tager udgangspunkt i et konkret ledelsesværktøj: workshop modellen. Grundlæggende har det initiierende spørgsmål været: hvorledes bør design processen ledes i byggeriet med det overordnede mål at skabe maksimal værdi for bygherre og brugere? Dermed kan forskningsprojektet ses som et produkt af den nuværende ledelses diskurs, hvor ”kundeværdi” er sloganet.

Et sådan spørgsmål kræver dog berettigelse og tilpasning i en akademisk kontekst. Spørgsmålet er først og fremmest relevant, fordi der de seneste år har været en massiv offentlig kritik af byggebranches produktivitet og formåen, ikke bare i Danmark, men også i en række andre lande (heriblandt UK og USA). Dette førte i første omgang til en række effektiverings og kvalitets forbedrende initiativer. Efterfølgende har fokus i stigende grad været rettet imod værdiskabelse. Et af argumenterne har været, at en indsats i forhold til effektivisering og kvalitet kan være delvist spildt, hvis det grundlæggende er de ”forkerte” produkter der skabes. Desuagtet er litteraturen kun sparsom med hensyn til forklaringer af begrebet ”værdi” i byggeriets projektering faser. Endvidere er forskningen inden for (arkitektonisk) designledelse kun på et meget tidligt stadie.

Med fokus på de helt indledende faser af projektering, der skaber udgangspunktet for de efterfølgende processer, har ovenstående ræsonnement ført til følgende tre forskningsspørgsmål:

1. **Hvorledes kommer kunden og andre interessenters opfatelse af værdi (værdi perception) til udtryk i byggeprojekters konceptuelle projektering processer?**

2. **Hvilke problemstillinger kan observeres i byggeprojekters konceptuelle projektering processer i relation til ledelse af kunde værdiskabelse?**

3. **Hvilke anbefalinger kan gives – på baggrund af teoretiske argumenter og empiriske observationer – med hensyn til projekteringsledelse generelt med henblik på det konceptuelle formål at skabe kundeværdi?**

For at kunne besvare disse spørgsmål indbefatter afhandlingen først en gennemgang af følgende teorimråder: værdi-teori (filosofi og social psykologi), teori om at designe, kommunikation og gruppedynamik. Derudover er følgende instrumentelle management koncepter beskrevet: Briefing / architectural programming, value management (værdiledelse) og value engineering, values-based management (værdibaseret ledelse), Lean product development og lean construction (trimmet byggeri). Fasemodeller for byggeri er ligeledes beskrevet.
Dernæst er fire kvalitative casestudier fremstillet og analyseret ved hjælp af en ”Refleksiv metodologi” der pragmatiske bygger på de tre metateorier: hermeneutik, kritisk teori og postmodernisme. Dette fører frem til syntesen der giver følgende svar (i kondensered form):

Byggeriets parters forskellige værdi perceptioner kommer til udtryk i den lokale diskussion og argumentation for og imod design alternativer. Til trods for at projekterende og entreprenører anerkender begrebet kundeværdi, forsøger de aktivt at få indflydelse på designet. Fordrejning af kommunikation, kodificeret sprog og retorik kan være gængse midler til at overtale ”modparterne” i en social proces. For at tegne et overskueligt billede af dynamikken, er en Vektormodel over Indflydelser på Værdiskabelse (VIV modellen) blevet udarbejdet.


Preface

In 2003 when I graduated as a civil engineer, words like lean, partnering and supply chain management were highly topical. In this way, I soon had the privilege to try out some of the new management ideas on two extraordinary Danish construction projects: the Tietgen Dormitory and the Danish Broadcasting Corporation’s new headquarter. I worked as a “process facilitator” with the task of coordinating site-work via lean methods (the Last Planner® System of Production Control). However, in spite of many good peoples’ efforts I (we) was challenged by problems, which seemed to originate from a time long before site-work had commenced. Being an engineer it was convenient for me to blame the architects. At the same time, NIRAS – the consulting engineering company that I worked for – had participated in various industry improvement initiatives and developed a design/value management concept, the workshop model, which they would like to qualify and/or improve. This essentially led to the present PhD.

Here at the end of the PhD journey, things have become much more blurred. It is somewhat a cliché to state that the more you learn the more you know you don’t know. But it is true. I have realized that value and designing are fascinating but highly complex phenomena, which cannot be ‘controlled’ in any easy way. I hope, however, that this thesis will be useful for both academics and practitioners in addressing these matters in the future.

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1 Introduction

In Denmark and in many other countries (e.g. the UK and US) substantial critique has been raised regarding the construction industry’s current level of achievement (Wandahl, 2005; Kristiansen, 2006; AIA 2007). Accordingly, in a Danish context many initiatives have been taken to improve efficiency of construction processes especially by means of ‘increased collaboration’ (partnering) and ‘industrialization’ through off-site production, logistics and lean construction (Kristiansen et al, 2005). However, the goal of construction is not only to provide a product efficiently and without conflict, but to provide an appropriate product, which is valuable to the client, stakeholders and end-users. This equally appears to be a well established discourse addressed in various research publications (e.g. Thomson et al, 2003; Macmillan, 2006; Zemke and Pullman, 2008). As a result, increased focus in construction management literature is being directed towards value creation and management. This is reflected in management concepts such as value management (e.g. Kelly et al 2004) as well as lean construction (e.g. Ballard et al, 2007), and is also the subject of the present PhD research project.

However, it is not a straightforward (management) task to operationalize ‘client value’ in construction. A great deal of construction work can be characterized as development projects, where a new team is assembled each time and the client expects a customized product. These types of projects encompass great uncertainty, creativity, iteration, learning and change in which also perceptions of value can change. Within this context, the client comprises end-users, owner and society etc. which may have conflicting goals and (changing) perceptions of value. Complexity is enhanced by the fact that the delivery team – that are to interpret and deliver client value – consists of even more different parties. Moreover, value creation is to be managed within an environment of cost effectiveness and down-stream claims for production specifications.

Accordingly the initiating problem statement can be formulated as:

A major course of the relative low level of productivity and client satisfaction in the construction industry is lack of understanding and useful mechanisms for handling client, stakeholder and user value and the creative conceptual design process.

To address this, a Danish consulting engineering company (NIRAS) has developed a value management (workshop) model, which seeks to ‘capture’ a thorough understand-

---

1 ‘Construction management’ will throughout the entire thesis be used as a broad notion that refers to management of construction projects, which includes both early design management and management of site production processes.
ing of client values at the outset of construction projects and manage the subsequent stages of the building process within a lean framework striving to ‘maximize value and reduce waste’. In continuation of this development work at NIRAS the present PhD has been initiated. This is to provide a more thorough understanding of the notion of value and establish the basis for further development of the workshop model – or an even better approach. Accordingly the purpose of the study can broadly be formulated as:

1. To develop practical guidelines for handling value in construction projects with the aim of achieving client, stakeholder and user satisfaction.

2. To contribute to the emerging research within management of value in construction

Thus the dissertation is both prescriptive in providing practical guidelines and descriptive in its search for (theoretical) understanding. Accordingly, the study can be seen as ‘problem-driven’ research, which by Scott & Davis (2007:17) is described as lying in the intersection between the traditional dimensions of theoretical, basic research and practical, applied research. In addition, problem-driven research is often interdisciplinary and takes its outset in questions from the ‘real world’ (Scott & Davis; 2007). This is also characteristic for the present thesis. However, before continuing with methodological considerations, the overall structure of the thesis is presented.

1.1 Structure of the thesis

The thesis is divided into eight overall chapters and the content of each chapter is outlined below. Thus, this section also functions as a reading manual for readers, who are not going to embark on reading the whole thesis, which, admittedly, has become quite long. However, before skipping the method chapter and going straight to the conclusions, the author would like to point at the central importance of the initiating chapters. Thus, the method chapter provides the basis for understanding the case-study analyses as well as the derived findings and recommendations.

Chapter 1: Introduction

This is the current chapter. After the present section, the chapter ends with a brief introduction to the ‘workshop model’, which formed the outset of the research project. The workshop model is referred to several times throughout the thesis and it is modified in the concluding chapter. However, the researcher also moved beyond this concept.

Chapter 2: Method

This section initially involves general considerations regarding qualitative and quantitative methods for generating data, the theoretical framework for analysing/interpreting
data and the overall structure of the research process (research design). This includes a
presentation of the three overall research questions and it is argued why a qualitative
‘Reflexive methodology’ (Alvesson & Sköldberg, 2000) has been adopted. It is also
discussed why other approaches, which initially were deemed relevant, have not been
applied. The use of theory is explained and the more specific techniques for data collection
are described. Next the analytical meta-theories Hermeneutics, Critical Theory and
Postmodernism are outlined. This includes some initial theoretical reflections on the
workshop model, which also outlines four ‘pre-understandings’ to be tested in the first
case-study. In the end, the criteria for ‘good research’, which have been adopted in this
thesis, are presented.

Chapter 3: Context
As part of the analytical framework, it is important to consider the societal context of
the research. Thus, in this chapter it is argued that the research can be seen as an affect
of a contemporary customer-value paradigm, and different explanations for the emer-
gence of this paradigm are put forward. Looking more specifically at the construction
industry, five process-protocols (from the UK, US and Denmark), which aim to describe
and prescriptively organize the construction process, are juxtaposed. It is argued that at
least in western countries, there is a very similar perception of what development phases
a (unique) construction project needs to go through. The analysis provides a framework
for describing the different stages in which the case-studies took place. In addition, the
chapter outlines what many practitioners perceive as generic phases in construction pro-
jects. Finally, the process-protocols can be seen as a common (design) management
tool, and, in that sense, the chapter works as an introduction to this phenomenon. If the
reader is very familiar with the construction industry, and the current discourse, this
chapter may be skipped.

Chapter 4: Theory
The theory chapter is divided into three sub-chapters describing respectively: (1) value
theory, (2) theory of designing and (3) communication and group dynamics theory. As it
is argued in the method chapter, these theories, in addition to the analytical meta-
theories, provide important background knowledge for interpreting the case-studies. The
theories are, however, also central to the synthesis and conclusions. In order to under-
stand the case-study analyses the reader is therefore advised to read these chapters.
However, if the reader is already familiar with some of the theories, he or she may pri-
oritise reading the summaries at the end of each sub-chapter.

Chapter 5: Management concepts
To avoid reinventing the wheel, five relevant management concepts are reviewed. Some
would argue that these concepts are to be regarded as theories. However, because of
their prescriptive nature, they are separated from the preceding theory chapter. The five approaches are: (1) Briefing/architectural programming, (2) Value management and value engineering, (3) Values-based management, (4) Lean product development and (5) Lean Construction Design. The chapter is summarized in a table that outlines key distinguishing features and associated management tools. The chapter provides background knowledge regarding some of the tools applied in the case-studies. In addition, the review forms the basis for pointing at the limitations in current concepts and practices (this is done in the synthesis). For a reader who is less interested in research, but more interested in practical tools and knowledge about existing management concepts, this ought to be an interesting chapter. However, if the reader is a construction management researcher, who is familiar with these concepts, he or she can skip the chapter – or maybe just read the introduction and the summarizing table.

Chapter 6: Case-studies
In this chapter, four case-studies are presented; (1) A Danish social housing project, where the workshop model was applied, (2) a Danish University office and nursery building, (3) a very large American Hospital project, where lean is the overriding management philosophy, and (4) a small Danish low-energy university guest-house project. Each case-study is separately presented and analysed via the methodological framework. Tentative conclusions, to the first two research questions, and a summary is provided at the end of each of the four case-study sub-chapters. All case-studies were examined in the conceptual or detailed design phase. This chapter is a core-chapter in the thesis.

Chapter 7: Synthesis
The synthesis draws on all preceding chapters. Initially the research questions are discussed based on all four case-studies and the theories presented. Conclusions to the first two research questions are made and their implications are discussed. In addition, in view of the findings, the relevance and limitations of the management concepts, described in chapter 5, are discussed. This leads to suggestions for theory development as well as practical recommendations (which is the answer to the third and final research question). Finally, an overall discussion is provided about the credibility and limitations of the research findings/recommendations. This also includes some (self-) critical meta-theoretical reflections. This chapter is a core-chapter in the thesis.

Chapter 8: Conclusions
The concluding chapter summarises the findings/recommendations and crystallizes the contributions to knowledge. In addition, suggestions for future research are provided.
To understand the preliminary basis and outset for the PhD project, the NIRAS value management workshop model is briefly presented below.

### 1.2 The workshop model

The workshop model has mainly been developed by construction industry practitioners. The method was first conceptualized as part of a range of developments in the Habitat consortium in the national Process and Product Development in Construction initiative. The development program commenced in 1994 and ended in 1999 and was supported by the Danish authorities who aimed to stimulate productivity and innovation in the Danish construction industry (published in Bertelsen & Davidsen, 2000). The Habitat consortium consisted of 10 companies representing the entire supply chain including building material suppliers, contractors and architectural firms, which were lead by NIRAS. Habitat’s purpose was to investigate possibilities of “re-industrializing” construction processes from the ideal of the manufacturing industry and thus the development of the workshop model was from the outset inspired by the lean construction community. Since then, it has largely been NIRAS that has developed the model to its current form together with a few other practitioners and academics outside the company. Until the PhD project commenced, the workshop model had in different versions been applied in about a dozen small to medium sized projects ranging from about $2M-$10M in capital cost.

The idea is to explore the client values on the basis of the client brief at the outset of the project stage and incorporate these into the conceptual (sketch) design through a series of creative workshops similar to the Walt Disney film making method of going through the stages of vision, realism and criticism. However, in line with the current trend, a partnering workshop is held prior to the VM workshops to build trust and communication. The four workshops are outlined in Figure 1.2.1 below.
More specifically workshop 0 is concerned with “process values”, understood as the values that the entire project team holds regarding cooperation and work ethics. Through discussion and consensus building, a partnering charter is made that reflects the agreed process values.

Workshop 1 is concerned with client ‘product values’ understood as underlying values that determine client’s judgment of the end-product. The aim is to make the ‘product values’ explicit and reveal ‘hidden’ values to address potential conflict and also create group consent among the stakeholders. This should give the design and delivery team an unambiguous understanding of the project objectives and thereby reduce downstream uncertainty and enhance productivity in design and construction. The client organization is not asked simply what kind of building it desires, because the client may have a limited point of reference in order to envisage a construction facility. On the basis of the value discussion it is up to the designers to create a facility beyond the client’s imagination. Also, the idea is that the value system can aid the exploring of multiple design alternatives instead of constraining the project through statements of preferred product solutions. The investigation of client values is done via a standard value agenda, comprising the main headings of: Beauty, Utility, Durability, Harmony with surroundings, Environmental issues, and Buildability (inspired by Vitruvius). The main value headings are broken down into sub-headings in what is called a value tree and prioritizing can be made (see example below). After the workshop at least three design alternatives are developed by the design team.
At workshop 2 the design alternatives are presented to the client and construction team and the designs are evaluated against the ‘product values’. Also time and cost restraints are introduced as well as any authority restraints. A decision matrix, in which the designs are ranked according to conformance to the value system, can be applied for guiding the decision making process. A winning proposal is then selected for further articulation.

The winning proposal is evaluated at workshop 3 called the criticism workshop in which all project participants have the opportunity to evaluate and criticize the design solutions in order to secure that the design is truly optimized in accordance with client values and boundary conditions. In addition the process is evaluated against the partnering charter as a starting point for the continuous cooperation in the subsequent stages of detailed design and construction.

Regarding documentation, the experiences of applying the workshop model in three refurbishment projects have been summarized in a report (Christoffersen, 2009) written by one of the workshop model inventors. This report has subsequently been evaluated independently by the Danish Building Research Institute (SBi, 2009). Although the experiences were positive, the latter report concludes that from a scientific point of view, the results are not reliable.

It should also be noted that the inventors themselves (prior to this study) pointed at the following opportunities for improvement; the workshop model does not explicitly deal with the coordination of information or with the design activity taking place in between workshops (Emmitt et al, 2004). Thus the extent of ‘design management’ is limited. Furthermore, the inventors called for a more rigorous academic evaluation (Emmitt et al, 2004; 2005), which became the outset of the present study.

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<tr>
<th>Durability</th>
<th>Easy maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low life cycle cost</td>
</tr>
<tr>
<td>Utility</td>
<td>Function</td>
</tr>
<tr>
<td></td>
<td>Technology</td>
</tr>
<tr>
<td>Beauty</td>
<td>Organic shape</td>
</tr>
</tbody>
</table>

*Figure 1.2.2: Except of a Value Tree*
2 Method

What is method? To an engineer it is often a matter of observing, hypothesizing, rational planning and rigid execution of experiments and/or collection of data – to minimize bias and increase reliability and validity of findings. If procedures are followed rigidly the conclusions will emerge as objective, scientific truths. However, if a social constructivist perspective is adopted, things get more blurred. Then method becomes more a matter of what theory or ‘lens’ is used to interpret social phenomenon. There are no objective truths, but more or less interesting interpretations and insights, which may arise from careful application of appropriate, generative theories. In line with this perspective Alvesson & Deetz (2000:5) claim, within the context of management research, that “Method connects theoretical frameworks with the production and productive use of empirical material”. Within this view, method is less a matter of ‘data management’, but to a higher degree a matter of careful, reflexive interpretation (Alvesson & Deetz, 2000:5). However, in spite of the opposition between different schools of thought, method usually involves a description of procedure or framework for interacting with empirical material (or other theories/interpretations), which makes explicit to the reader how interpretations and conclusions are produced. This is the objective of the present chapter, which is structured as follows: First the research questions will be presented together with a description of the overall ‘research design’. This section initially involves general considerations regarding qualitative and quantitative methods for generating data, the theoretical framework for analysing/interpreting data and the overall structure of the research process. Before going deeper into a description of the techniques for data collection and the theoretical framework, it is also argued why other approaches, which initially were deemed relevant, have not been adopted. Next the techniques for data collection as well as the analytical framework are described in more detail, followed by some concluding remarks.

2.1 Research questions and delimitation

In order to give recommendations for the development of the workshop model and management of value in general it seems appropriate first to explore the concept of value in construction design practices as well as potential issues in relation to client value creation. Thus in continuation of the earlier described problem statement and purposes of the research-project, the research questions have been formulated as follows:

1. How do the client and other project stakeholders’ perceptions of value manifest in conceptual construction project design-processes?
Research question 1 and 2 reflect the empirical oriented descriptive part of the research, whereas research question 3 has a prescriptive orientation. The purpose of research question 1 is to establish a greater understanding of the ‘nature’ of value in a construction design project setting. Together with research question 2, the aim is to investigate the ‘validity’ of the problem statement, the rationale for concepts such as value management and possibly highlight central issues that may arise in relation to client value creation. The answers are pursued through a reflexive ‘dialogue’ between theoretical reasoning and engagement with empirical data (case-studies). The research is thus neither strictly inductive nor deductive. The answers to research question 1 and 2 will establish a basis for the third research question, which reflects the ambition of generating practical recommendations in relation to ‘management of value’ in construction projects. This is in line with Alvesson & Deetz (2000:19-20) who state that (critical) research should have the ambition of providing “transformative redefinition” for positive action. Focus is mainly limited to management of value in temporary project organisations, although it is recognized that this is interlinked with values at a corporate or societal level.

Looking at these questions it should be noted, that they involve the pivotal terms ‘value’ and ‘client’ which are highly ambiguous and calls for further clarification. The research project will specifically reflect on the meaning of these terms not to produce ‘operational meaning’, which according to Silverman (2006) can stifle the research via premature categorization, but to provide a discussion of the terms as a background for ‘dealing’ with them.

In addition, focus is mostly delimited to addressing the early (programming and conceptual design) stages of construction projects, given that these stages are believed to be crucial in defining the central parts of the product and process and consequently impacts ‘value creation’ to a great extent. Acknowledging that design management also has various meanings (see London et al, 2005) it should be noted that by construction design management the author mean managing and integrating the design process between multiple stakeholders (companies) on a construction project. Thus focus is deliberately limited to exclude the strategic organizational management within the design firm, although this, as argued by Emmitt (1999), interfaces with management at a project level.
Also, the word ‘project’ needs some reflection. Thus, it has been argued by Thuesen et al (2009) that innovation may be stifled by a tendency in both literature and practice to equate construction work with a project environment including newly formed groups of specialists, creating unique products for unique clients. Thus, this paradigm may blind researchers and practitioners from developing fundamentally new (management) practices, with higher degrees of integration and standardization of both products and processes (e.g. mass-customization). The researcher acknowledges this viewpoint and it is apparent that the problem statement of this research project also is a child of this prevailing paradigm. Consequently the research may contribute to reproduce the paradigm. However, a great deal of construction work is in fact undertaken in a project environment and so the research may nevertheless be relevant to those who uphold this way of working.

Finally it should be noted that the answering of research question 3 will be of a more theoretical/hypothetical sort, because of the limited timeframe of the research project that does not leave room for both development of guidelines and their implementation for some kind of evaluation.

### 2.2 Research design

#### 2.2.1 Qualitative or quantitative research?

Research methods are often characterized as either quantitative or qualitative. Generally speaking, quantitative research is concerned with pre-established variables (categories) and their correlations, which can be found via statistical analysis (Silverman, 2006:43). However, the concept of value is highly ambiguous and especially in architectural design it is hard to quantify and measure (Lawson, 2006). In addition, the technical uniqueness and contextual difference of each construction project, makes it nearly impossible – within this subject matter – to establish a ‘norm’ as well as standardized comparable data. For these reasons quantitative methods have by large been rejected as useful within this research project.

The strategy here is to perform case-studies and observe how the participants (inter-) act (what are they doing?) with particular emphasis on how the client and other project participants perception of value may (or may not) manifest (research question 1). The aim is to achieve a ‘higher understanding’ of the concept of value and in particular the dynamics of values within a construction project setting. In this process, attention is directed towards ‘issues’ as they are experienced by the participants (research question 2). This can form the basis for a critical assessment of the underlying rationale of the work-
shop model and similar value management concepts and consequently lead to recommendations for their development (research question 3).

In relation to case-study projects, where specific management concepts have been applied to ‘increase’ client value, it will (unfortunately) be impossible to determine how the participants ‘act differently’ as an isolated effect of the management concept. However interviews, as supplement to observations, can in these cases provide valuable accounts of the ‘effects’ of the management concept(s) via the participants, who can relate their ‘experience’ to their ‘normal’ practice. This will provide valuable information in relation to research question 2 and 3. In addition the subjective concept of ‘value’ can be dealt with through interviews (the actors’ intentions or values cannot be observed). Interview accounts are however highly problematic in nature, which will be discussed in the chapter Collection of data.

The interview accounts could also be obtained through questionnaires, however questionnaires have a tendency to construct and categorize the inquiry in a structure which limits the possibility of obtaining new insights and ideas.

There is however one type of ‘effects’ that are traceable – these are the written texts and forms, which are particularly connected to the management concepts (such as a partnering agreement and ‘value-tree’). Thus, focus should also be directed to these artefacts and the way they are used as reference points in the ongoing design process. Likewise, the project participants’ perception of value may manifest through the documents they produce. For these reasons, the gathering of project documents is an equally important method for data collection.

Silverman (2006) distinguishes between research objectives to learn about ‘thinking and feeling’ and ‘doing’. Yet, when looking at both ‘value’ and ‘effects’ of management this research project is concerned with both. The methods of interaction with empiric data and it’s ‘status’ in the research project will be further discussed in the chapter Collection of data.
2.2.2 Use of theory

More fundamentally than distinguishing between qualitative or quantitative methods, research is often characterized by its underlying ontology (and equivalent epistemology). The main two outer-positions are (1) those who believe that reality exists in a way that can be described objectively and (2) those who consider (representation of) reality as a social construction. The first category – that is associated with ‘positivists’ – is especially dominating within natural science where theory is build via empirically grounded conclusions. Emphasis is on experiments that are conducted with rigor mostly by means of quantitative methods in order to achieve un-biased data or ‘facts’ to support or reject hypothesis (deduction). However, critics have argued that there is no such thing as interpretation-free and theory neutral facts (Alvesson & Sköldberg, 2000; Maaløe, 2002). Results will always be represented in a language that is ambiguous and unstable and which is situated and interpreted within a political ideological context (Alvesson & Sköldberg, 2000). Thus, within the second category data is viewed as a construction of interpretation. Here emphasis is on interpretation and ‘meaning’. Accordingly, some researchers within this paradigm almost reject the usefulness of empirical data, but the main tendency is to build theory via qualitative methods and induction. Thus, within social science, where the second category has found a foothold, there is likewise a dividing line between those who place great emphasis on empirical data and those who are more or less steered by some philosophical ‘grand theory’ (Alvesson & Sköldberg, 2000). Where some of the critique directed at positivists may apply for some of the ‘empiricists’ within social science, the ‘grand theorists’ may be critiqued for their “scholastic application of time-honoured classics, instead of individual creativity without too many side glances at the venerable – but unfortunately often rather dusty – old masters” (Alvesson & Sköldberg, 2000:48). Thus, a pitfall may be that the theory as a pre-understanding becomes a ‘straitjacket’ when ‘constructing’ empirical data and consequently reproduces itself without reflection or anchoring in ‘real’ life.

Based on this understanding, Alvesson & Sköldberg (2000) have developed a rather pragmatic methodological approach, which they call a ‘Reflexive Methodology’ (2000). In their foreword Alvesson & Sköldberg (2000: vii) states that their endeavour can be described “as an intellectualization of qualitative method” via incorporating philosophy of science or equally “a pragmatization of the philosophy of science” by bringing the abstract theories down to a level where they become useful in a research context – namely to stimulate reflexion. ‘Reflexion’ is pursued through the use of ‘different levels of interpretation’ primarily based on hermeneutic interpretation, critical theory and postmodern self-critical and linguistic reflection (the perspectives will be described in more detail in chapter 2.4 “Interpretation”). Thus, this approach seeks to avoid dis-

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2 The word paradigm is used here as in common speech; as a very broad term interchangeable with ‘way of thinking’
criminating in favour of one single analytical position and therefore the research does not (consciously) represent a particular ontology or epistemology except that it leans towards the broad concept of social constructivism. This methodology was found appealing and useful to adopt in this research project.

**The meaning of reflexivity**

In this context, the term reflexive or reflexivity seems to call for further explanation. The word has been used within the field of sociology by authors such as Giddens and Bourdieu (Alvesson & Sköldberg, 2000; Andersen & Kaspersen, 2000). It is also noteworthy that London et al (2005) adopted the term and argued that reflexivity is a key competence in architectural practice. In addition, Orlikowski (2004) has argued for greater reflexiveness in management and designing. Nonetheless, reflexivity does not seem to be a well-defined term (London et al, 2005). Thus, Merriam-Webster dictionary online (Merriam-Webster, 2010) defines reflexive as: (a) directed or turned back on itself; also: overtly and usually ironically reflecting conventions of genre or form; or (b) marked by or capable of reflection. In addition, within the field of sociology, reflexivity can be defined as: *the circumstance that people tie linguistic and symbolic perceptions to everyday practical actions* (Andersen & Kaspersen, 2000:218, author’s translation). However, translated into a research context, Alvesson & Sköldberg (2000) claim that reflexivity includes two basic characteristics (1) careful interpretation and (2) reflection (Alvesson & Sköldberg, 2000:5). The term **interpretation** implies that reality cannot be objectively ‘mirrored’ and the researcher should be conscious about this and reflect on her pre-understandings, theoretical assumptions and contextual circumstances etc. which may ‘structure’ the interpretations and representation (the researcher’s action). Thus, reflexivity is seen to be closely related to reflection, but includes open attention to the ‘mental models’ and influences that underlie reflection and action (representation). Accordingly, Orlikowski (2004:95) indicate that reflexiveness is about **“acknowledging the constitutive role of representation”**. In addition, Alvesson & Sköldberg (2000:248) state: *we have thus chosen the term reflexive interpretation as a way of indicating the open play of reflection across various levels of interpretation. This not only highlights the explicit, open use of analytical position, but also the multiplicity of ‘lenses’. Thus, Alvesson & Sköldberg (2000:246) state: “The whole idea of reflexivity...is the very ability to break away from a frame of reference and to look at what it is not capable of saying”* (Alvesson & Sköldberg, 2000:247). Thus a key distinguishing feature of reflexive research is that it does not give omnipotence to a single interpretive perspective – more than one perspective is taken seriously to avoid getting caught in a single philosophical position. To be reflexive entails being willing to be less certain (Orlikowski, 2004).
The challenge of multiplicity
A great concern in relation to this methodology is the challenge of using more than one perspective and the great amount of work it may inflict (a concern which became substantiated as the research progressed and explains the length of the thesis). Therefore to limit the extent of the analysis, theory intimately linked to empirical data such as grounded theory and ethnomethodology, which are also described within this analytical framework, have not been used. This is in line with the argument made by Alvesson & Sköldberg (2000), who state that these ‘data-oriented’ methods often include a great amount of data-processing, which is often not worth the effort; reliance on mechanical coding of ‘reality’ often produce trivial results, which (mistakenly) are represented as ‘objective’ although the construction of categories are highly subjective (Alvesson & Sköldberg, 2000). Another argument for abandoning (grounded theory) coding of observations is also the mixture of data that were accessible in the research project, which made it hard to establish and validate categories (see section below regarding observation). A further weakness to the empiricists’ perspectives is that they do not reflect on political concerns and values, since it is only observable ‘reality’, which is described.

A ‘horizontal approach’ was chosen; where interpretations inspired by the tree perspectives (hermeneutic, critical theory and postmodernism) are made in parallel (and not as interpretations on interpretations). However, a concern was still to limit the analysis, since each of the three (remaining) perspectives can provide a comprehensive analysis separately. The risk of ending up with a too lengthy and exhaustive analysis was further spurred by the relatively evasive rules for interpretation within these perspectives. There are no boundaries for the effort (e.g. the hermeneutic cycle of inquiry is endless). In addition, there is a risk of over-theorizing by the use of various philosophic positions (Silverman, 2006). In order to address this and provide some sort of structure, a relatively strict and simplified representation of the three perspectives was therefore produced, which is presented below together with the chosen principles for interpretation. Thus the author does not claim to provide a full and comprehensive analysis guided by each of the three perspectives (which would be three theses on their own). Instead the perspectives are used as meta-theories for inspiration, with the aim of generating reflexivity and ‘creative tension’ (as it is also proposed by Alvesson & Deetz; 2000:109). The author acknowledges that this exposes the thesis to critique from both the empiricists and the grand-theorists since the research does not comply with any of these traditions.

At another level, the research also addresses a multiplicity of perspectives, since various management concepts aim at handling the same problems as value management tries to tackle. These concepts are explored in chapter 5, not to get a full overview, but to a lesser or greater extent they are used as a source of inspiration and insight as well as providing the background to avoid ‘reinventing the wheel’ (Alvesson & Sköldberg,
2000). In addition to this, theory regarding value, (architectural) designing and communication and group dynamics theory will be reviewed because of their relevance to the subject matter. The theories are used (together with the three overall ‘meta-theories’) when interpreting empirical data and as a source of inspiration to challenge and develop management practice.

2.2.3 Overall research design

The overall research design is illustrated in figure 2.2.3.1 below. This shows more explicitly a categorization of theories, which is used within this research project; distinction is made between meta-theory, theory and management concepts. This distinction is somewhat artificial and there are no clear boundaries between these three categories. However, the categorisation is useful in order to manage the various bodies of literature which are relevant to the subject matter. Theory can be understood as ‘a way of seeing and thinking about the world’ (Alvesson & Deetz, 2000:37) which is how the three perspectives within the Reflexive Methodology are used – they are grouped in the category termed ‘meta-theory’. Theory can also be understood as an abstract representation or mirror of reality (Alvesson & Deetz, 2000:37). This is a more conventional way of understanding theory; an understanding that is descriptive of the ambition lying behind the theories within the category that is simply termed ‘theory’ – e.g. communication and group-dynamics theory. These theories have been conceived to provide ‘correct’ understanding of phenomena based on ‘facts’. Both meta-theory and theory often provide inspiration more or less explicitly for the third category, management concepts, which is less descriptive and more prescriptive/instrumental/ends-oriented than the other two categories.

Figure 2.2.3.1 furthermore shows how the meta-theoretical analytical framework effects the way data is collected (generated). Together with theories of value, designing and communication, the case-study data and meta-theory provide the primary building blocks to the analyses that are also framed in the context of the construction industry (though local context is also considered). The purpose of the case-study analyses is to find tentative answers to research question 1 and 2. The analyses also aim to identify issues in relation to any specific management concept used - knowledge of these concepts thus provides input to the analyses (background knowledge). However, the literature review of various theories and management concepts also provide inspiration for dealing with the issues identified in the case-studies. Thus, via a synthesis of the analyses, theory and theoretical ‘solutions’, suggestions are proposed for a development of the workshop model and design management in general (RQ3), which are critically reflected on through the analytical framework. This leads to the conclusions of the thesis. Figure 2.2.3.1 also illustrates how the research design is descriptive analytical, but at the
same time aims to be prescriptive through its normative suggestions for development of the workshop model and design management in general.

Figure 2.2.3.1: Research Design

2.2.4 Reflections on other approaches

Action research has also been considered as a possible methodology to adopt in this research project. Action research is a methodology where the researcher together with members of a social system aims to facilitate change by going through a participatory cyclic process involving the phases of: diagnosing, action planning, action taking, evaluating, and specifying learning (Susman & Evered, 1978). Thus, action research takes its outset in an established workplace context, in which participants and researcher in a structured way reflects on ‘the situation’ in order to develop their practice. However, the workshop method has not become an established ‘practice’, so, if action re-
search was adopted, one would try to change a change-concept at its first implementation in the specific (temporary) workplace, which would probably seem quite strange to the participants. It would be hard for the workshop participants to perform a diagnosis of something, which they had not participated in before. So, action research would seem more suitable if more than one project, with the same project participants, was established. However this was not deemed possible within the present research project.

It has also been considered to adopt a rather new methodology named “Design Science”, which seems quite similar to action research (Järvinen, 2007). Design science is to be distinguished from sheer explanatory research, which is more concerned with understanding of phenomena, whereas design science puts more emphasis on providing solutions to ‘real-world’ problems (Van Aken, 2005). One could look at the workshop model as a ‘solution’ under development and, as mentioned before, the research aims partly to be prescriptive and may therefore be investigated via a design science approach. Accordingly, Koskela (2008) suggests that construction management in general should be redefined as design science. However, as pointed out by Schön (1983) design science rests on the presumption that a well informed instrumental ‘real-world’ problem is established to which a solution or ‘technological rule’ (Van Aken, 2004) can be prescribed and it is as such a reformulation of a positivist science; a paradigm which, as mentioned earlier, has been the subject of substantial critique – especially within management theory (e.g. Evered & Susman, 1978; Schön, 1983). The approach may work in clinical research, as the proponents for design science refer to (e.g. Van Aken, 2004; Koskela, 2008), but in the view of the author it seems problematic within the present field of research. Also, in the author’s opinion, it is somewhat unclear, how exactly design science is to be performed and what its key distinguishing elements are (which may be due to the fact that design science is not a very well established methodology). Furthermore one may question the distinction between descriptive and prescriptive research, which seems to be so central to design science – how is it really possible to be descriptive without being implicitly prescriptive? This would entail objectiveness in (social) research which is highly unlikely and it is as such an indication of a positivistic world-view, which is not the view of the author. However, one may still view this research as design science, but it is not the intention of the author to explicitly live up to any requirements of this methodology.

The more specific techniques for collection of data will be described below followed by a description of the three perspectives used for interpretation.
2.3 Case studies and collection of data

Predictive theories and universals cannot be found in the study of human affairs. Concrete, context-dependent knowledge is, therefore, more valuable than the vain search for predictive theories and universals (Flyvbjerg, 2006:224)

The above quote is a general argument (among others) for conducting case-study research within the field of social science. The value of case-studies, according to Flyvbjerg (2006), is that it may provide a higher level of learning through its richness of details, which cannot be obtained in for example quantitative surveys or be represented in general theories. Yin (1994:13) provides the following definition of a case-study:

A case-study is an empirical inquiry that
- investigates a contemporary phenomenon within its real-life context, especially when
- the boundaries between phenomenon and context are not clearly evident.

Maaløe (2002:34) adopts this definition and adds that case-studies are also characterized by their reliance on many data sources. To provide guidance as to when case-studies are appropriate, Maaløe (2002) places social science research methods on a continuum between the two extremes of fine-grained methods and coarse-grained methods. The fine-grained methods, which include case-studies (but also biographies and ethnography), are best suited when the unit of analysis is everyday operations of a company or aspects of a person’s life, which is heavily effected by specific circumstances and context. Whereas the coarse-grained methods (e.g. statistical methods) are better suited when the unit of analysis is easy to identify and count. As described above, value is hard to identify and measure and it seems very dependent on the social context (as will be substantiated in the theory chapter). Therefore, fine-grained methods seem more appropriate.

Having broadly decided on a case-study approach, the next thing to consider is what type of case-study approach. Maaløe (2002) distinguishes between four ways of conducting case-study research:

- Solely descriptive case-study research e.g. ethnography
- Theory testing case-study research
- Theory building theories e.g. by means of Grounded Theory
- Explorative-integration

Ethnography is usually conducted over years to investigate a specific (sub-) culture primarily through observation. A theory testing case-study approach – which Yin
(1994) is a clear proponent of – can be used when one or two rivalling theories exist for a specific phenomenon. Here a single case-study may be a powerful instrument for falsification. In opposition to this, Grounded Theory proponents claim that theory can become a straight jacket, which clouds the researchers mind from seeing the ‘real world’ (Maaløe, 2002). In stead, it is argued, that theory should be built via a bottom-up approach, which entails coding of observations (and thus presumes that the researcher can represent reality objectively). The fourth type, Explorative-integration, tries to integrate aspects of both the theory-testing and theory-building approaches, while at the same time being attentive to the researchers pre-understandings and ‘bias’ (Maaløe, 2002).

Ethnography was rejected within the current research project, because its focus is broader and a multi case design was preferred (as will be described below). Regarding the theory testing approach, the problem was that there were no well-established, testable theories of how value manifest in construction design processes. Furthermore, as argued above, Grounded Theory has been abandoned mainly because it is perceived as undue time-consuming and naïve. This left only one case-study category option; the Explorative-integration approach. This approach aligns well with the analytical framework as it advocates reflection (Maaløe, 2002:95). Accordingly, the researcher should both distance herself from grand theories but at the same time acknowledge that it is impossible to avoid theory. Theories should be laid out openly, “not to idolise them or cling to them, but to the extent possible to distance oneself from them” (Maaløe, 2002:96). Furthermore, in line with the analytical framework, Maaløe (2002) argue that one way to proceed is to experiment with different ways of viewing and analysing. Specifically he draws attention to Allison’s (1971) analysis of the Cuba crisis, where three distinctive theories (the rational actor model, the organizational process model and the governmental politics model) where used to provide complementary perspectives on the same phenomenon. The explorative-integration approach adopts a learning perspective in which the researcher oscillates between literature study, field data and methodology and it consequently draws on both the hypothesis testing approach (pre-understandings are tested) and theory building approach (pre-understandings may be revised through confrontation with empirical data and alternative theories).

The next thing to consider is whether one or multiple case-studies should be performed. An argument for only conducting one case-study would be the identification of a ‘critical’ or ‘extreme’ case (Yin, 1994; Maaløe, 2002) – e.g. the first or most unconditional application of the workshop model. However, only one application of the workshop model occurred within the time-span of the research project and it was in a rather compromised version, where most of the design had already been developed. Thus, practical circumstances may determine the research design as much as strategic choice. However, the purpose of the research project was also to achieve a more general understanding of
the dynamics of values in a (construction) design process and how it can be managed. Therefore a multiple case-study approach was chosen to broaden the perspective (Maaløe, 2002:70).

Nonetheless, all cases should have a specific purpose (Yin, 1994). In this research project, the choice of incorporating four case-studies was partly as a matter of time and resources, but also because they differed in their management approach: (1) In the first case-study, the workshop model was applied; (2) in the second case-study no specific management concept was applied; (3) in the third case-study lean was adopted; and (4) the fourth case-study was set up as a partnering project. The aim was not to ‘test’ these management approaches (conventional, partnering, value management, lean) to point at the ‘best’ concept in relation to client-value creation, since this would lead to a difficult discussion about the central features of partnering, value-management and lean (had they been properly implemented?). In addition, it would be difficult to isolate the ‘management approach’ from other influencing factors, since the case-studies also differed in size and type of client. Furthermore, one project was taking place in the United States, while the three others were Danish projects. However, these differences were viewed as an advantage in that any patterns, which potentially showed to cut across the case-study projects, would seem stronger. Also, some accounts of ‘effects’ can be obtained via interviews and attention to concept specific ‘texts’. More arguments for the relevance of each specific case-study will be provided in chapter 6.

Another typological distinction within case-study research is the length of the study. One may for example conduct two long-term ethnographic studies or multiple short term case-studies. In this specific research project, this has again more or less been determined by practical conditions; two case-study projects came to a halt because of financial concerns. In addition, the project where the workshop model was applied was at a very advanced stage when the research began. Also the time-frame for obtaining data in the case-study abroad had its natural limitations.

Regarding the more specific use of data collection techniques, the strategy in this project has been multifaceted. This is specifically recommended by Yin (1994) as a means for triangulation. However, as argued above the aim here is to ‘open up’ and provide a more diverse picture – not to establish the ‘truth’. In addition, the reason for doing this was also practical in that the case-study projects provided different opportunities and limitations for data collection. As described above, both interviews and observations have been used as well as gathering of project documents (these data collection techniques will be further described below).
Concerning the presentation of case-study data, the research methodology provides two choices: One is to present each case three times as different aspects of the ‘raw’ data will be noticed and emphasized within each meta-theoretical perspective. Protocols for generating the data would then have to be constructed for each of the three theoretical perspectives. Another is to provide a single presentation of the data and subsequently perform three analyses. The data would then have to be generated through a less strict protocol and, as proposed by Maaløe (2002:120), presented as a chronological narrative that displays its multiplicity with implicit awareness of the different theories that are to be used for interpretation. The latter option was, to the extent possible, chosen for this research project.

In summary, the objectives of the research project have been pursued through relative short-term case-studies, within an explorative-integrative approach, which may not be useful for formal generalization, but works as examples (Flyvbjerg, 2006) that provide context-dependent answers to the research questions. Collectively the differing cases may, however, give an indication of potentially more general relations and issues to overcome when seeking to manage value. In the following, the different data collection techniques will be described in relation to the research project.

### 2.3.1 Observation

**Site, access, identity of researcher and recording observations**

Silverman (2006) advocates the use of ‘naturally occurring data’ such as observation of members in a ‘natural’ environment instead of e.g. interviews, because of the ‘bias’ associated with the local contextual influence of the ‘constructed setting’. Within this research project it has only been possible to make relatively short term observations, which are instrumental in exploring what participants are ‘doing’ – not what they are thinking and feeling, which would be the rational basis for participation in line with ethnographic studies.

The sub-heading of this chapter provides a list of conditions, which according to Silverman (2006) should be considered prior to data collection. The ‘research site’ where to obtain data will naturally be workshops and design meetings, however observations within a project office can also provide valuable data, because this is where ‘the work gets done’ in between meetings. Then one needs to choose what to observe, because the process is not restricted to a sequence of meetings. In this case focus has been on conflicts, problems and (unexpected) design changes, where it seemed likely that values would be expressed. Regarding data ‘access’ the setting can be described as a ‘private’ and temporary organizational setting where project stakeholders’ willingness...
to participate in the (overt) research is crucial. Thus the stakeholders are gatekeepers (Silverman, 2006) and can easily ‘obstruct’ the research by limiting the access or restraining e.g. the use of sound-recording. Therefore it is important to gain trust. However the identity of the researcher was not viewed as an ‘issue’ in this respect. As a male researcher, in a male-dominated industry, with practical experience working as an engineer, thus being a ‘member’ of the group, the odds of gaining trust was fairly good (Miller & Glassner, 1997). Also, because workshops include many unfamiliar participants and design meetings often include external consultants/specialists, the researcher is not likely to have dominated the setting. However when conducting interviews the researcher’s affiliation with the industry partner (a consultancy company) – thus not being an entirely independent researcher – may have influenced the narratives (see discussing on interviews below).

The use of sound-recordings were preferred because it is possible to return to the ‘original data’ and make multiple interpretations, whereas the usefulness of field notes are more limited, because they, to a greater extent, are influenced by the researcher’s subjective recording of ‘relevant’ data (Silverman 2006). Because ‘speech’ is recorded it is also possible to pay greater attention to ‘looking’ at the arrangement and observing behaviour. Video-recordings of course provide very ‘rich’ data, but in most instances it is not possible to get approval of conducting such recordings. Also, video-recordings may influence the situation to a greater extent than sound-recordings.

As management of value seems to somewhat depend on communication, it has been considered to use Bales (1950) Interaction Process Analysis (IPA) coding scheme to structure observations. However, the case-study projects differed in so many ways – both in structure of meetings and ‘accessibility’ to perform observations – that the coding scheme was abandoned. This may be perceived as a weakness in methodology, since coding would bring more structure to the construction of observations. However, as touched upon earlier, coding also has some downsides to it; Pre-established coding may not coincide completely with the characteristics of the phenomenon observed and can constrain the research with premature definition of variables during the observation (Silverman, 2006). Accordingly, without repetition of a certain kind of phenomenon, like the workshop model, the coding scheme cannot be tested for any adaption. In addition, coding is often very laborious. Accordingly, Bales (1950) states that a trained observer scores 10-15 acts per minute and consequently the amount of data can become quite substantial over a three hour design- or workshop meeting, and it can be argued, in line with the analytical framework, that instead of data-processing, effort should rather be directed at comprehensive reflection (Alvesson, 2003).
Nonetheless, to provide some structure, the generation (and presentation) of observational data has broadly been directed by the protocol shown in Table 2.3.1.1. The first item is obviously important to the research project. Item 2 and 3 relate to the decision-making process surrounding design development and are based on an understanding of value as a subjective judgement (which will be substantiated in the theory chapter) that may\(^3\) manifest as the basis for decision making. Item 4 and 5 also relate to research question 1 as perceptions of value are expected to manifest in discussions of alternatives/ways to proceed. However, these conflicts or situations of uncertainty are also expected to provide interesting data for answering research question 2 as they are situations where management is called for and trade-offs, in relation to client value, may be a result. The protocol for enquiry and representation will be further described in connection to each specific case-study project.

<table>
<thead>
<tr>
<th>Protocol for observation</th>
<th>Research question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Instances of direct expressions of values – as in value management workshops</td>
<td>RQ1</td>
</tr>
<tr>
<td>2. Instances of argumentation for specific design solutions</td>
<td>RQ1</td>
</tr>
<tr>
<td>3. Instances of considering and/or performing design changes</td>
<td>RQ1</td>
</tr>
<tr>
<td>4. Instances of (apparently) opposing interest/value conflicts and how they are managed</td>
<td>RQ1/RQ2</td>
</tr>
<tr>
<td>5. Instances where participants express frustration or uncertainty about the appropriate way to proceed</td>
<td>RQ1/RQ2</td>
</tr>
</tbody>
</table>

Table 2.3.1.1: Protocol for observation

2.3.2 Interviews

The interview can be seen as a local encounter between the interviewer and interviewee which constructs ‘accounts’ impregnated by contextual conventions, impression management, scripts and construction of preferred and/or suitable identities (Dingwall, 1997; Alvesson, 2003; Silverman, 2006). Therefore some researchers advocate that the interview can only be studied as an ‘artefact’, without any relation to the ‘exterior world’ (Dingwall, 1997, Miller & Glassner, 1997). This view is close to what Silverman (2006) terms \textit{constructionism}, that according to Silverman is one of three predominant interview ‘positions’. The other two orientations are \textit{positivism}, which acknowledges bias, but treats the interviews as possibly reflecting reality, and \textit{natural-}
ism, that aims for authentic accounts of the interviewee’s experiences. However, Silverman (2006) argues that constructionism can be concerned with both ‘content’ and ‘form’ when analysing interviews and in principal such a pragmatic approach seems appropriate to this practice-oriented PhD project. An extreme (postmodernist) focus purely on the local encounter of the interview, would be without interest, while a positivistic or naturalistic approach, without consideration of the local contextual influence on the interviewee’s accounts, would seem too naive and out of line with the overall analytical framework. Accordingly Alvesson (2003) distinguishes between neo-positivism, romanticism and localism, which basically equals Silverman’s three categories, but Alvesson argues that the ‘localist’ view (constructionism), which Silverman represents, is to narrow minded not (sufficiently) appreciating the value of insights regarding ‘reality’, which some knowledgeable interviewees may provide. Accordingly (Miller & Glassner, 1997) argues that a purely ‘localist’ approach grant narratives omnipotence. Also the localist perspective is criticized for overemphasizing the ‘data processing’ of conversation- and discourse analysis, at the expense of interpretation and reflection (Alvesson, 2003). However, within the chosen methodology, the status of the interview data will differ with the ‘application’ of each of the three theoretical perspectives.

What, why and how?
According to (Kvale, 1994:102) the researcher should consider three fundamental questions before conducting interviews: (1) What is the subject of the interview; (2) Why is the interview conducted; and (3) How should it be performed.

The subject of the interview is management of value in the conceptual phase of construction projects. The purpose of conducting the interviews is to get insight into the participants’ experience of the design process and any particular way of managing value (like the workshop model) – e.g. did the workshop have an effect and if so; what kind of effect? How did each participant view their role in the process? Also the purpose is to test the researcher’s pre-understandings and preliminary interpretations and hypothesis.

The most relevant interviewees are considered to be the client representatives, the value manager/facilitator and construction professionals, who have participated in the design process. In relation to the different actors the interviews have slightly different focus. Regarding the client representatives’ the aim is to get accounts of their overall ‘satisfaction’ and perception of the results of the process with special attention to ‘problems’ and ‘dissatisfaction’ in order to elicit focus areas for development (RQ2). The aim of interviewing the construction professionals is to get accounts of the ‘differences’ which they have ‘experienced’ (or choose to speak of) when comparing for example the workshop model to ‘normal’ practice. This may provide valuable insights in relation to re-
search question 2 and 3. Also, the interviewees can give their accounts about particular observations, which the researcher has found particularly interesting. This is not to perform ‘triangulation’ of findings, to achieve some ‘truth’ about reality, which is problematic because of contextual differences influencing the data (Silverman, 2006), but to establish a more diverse picture. Finally the researcher will attempt to establish interviews with ‘representative informants’, which have worked on projects ‘behind the curtain’ of official meetings. This is to get an impression of the depth of the ‘reality’ observed in meetings as well as to get different accounts than those of high-ranking representatives. This is a critical theory principle that hopefully will enrich the data (Alvesson & Sköldberg, 2000).

As to how the interview should be performed (Silverman, 2006:110) distinguishes between four kinds of interviews:

1. The structured interview
2. The semi-structured interview
3. The open-ended interview and
4. The focus-group interview.

As described, the overall purpose of the interview study is twofold: It aims to test hypothesis (pre-understandings) and explore the participants’ experience of the design (management) process in relation to the subject of value creation. Therefore the semi-structured approach seems suitable because it is open to new perspectives while keeping a thematic structure (Kvale, 1994:129). The focus group interview is rejected because the researcher would like to get in-depth accounts of each participant’s experience without them being influenced by other focus-group members.

Prior to conducting the actual interview the interviewees were informed about the purpose of the interview and how it would be used in the ongoing research. Also the interviewees were offered to be anonymous, though references would be made to his or her profession. Although this may reproduce conventional role-frames and limit the anonymity (and consequently the will to speak freely), it was considered to be too important to any reader of the thesis, to omit this information.

Additionally, to challenge ‘scripts’ and institutionalized talk during the interview Alvesson (2003) suggest interventions by rephrasing questions or asking the interviewee to rephrase their accounts. This principle was pursued when it was recognised to be relevant; however, such discoveries (interpretations) of institutionalized talk etc. are more likely to emerge when conducting the analysis afterwards (via sound-recordings).
The interview guides can be seen in appendix 3 and 5, but the overall protocol for enquiry is shown in table 2.3.2.1 below.

<table>
<thead>
<tr>
<th>Protocol for interviews</th>
<th>Research question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The participants evaluation of the case-study project</td>
<td>RQ1</td>
</tr>
<tr>
<td>2. The participants perception of problems and effects associated with the chosen management approach (e.g. the workshop model)</td>
<td>RQ2/RQ3</td>
</tr>
<tr>
<td>3. The participants suggestions for improving the chosen management approach</td>
<td>RQ2/RQ3</td>
</tr>
<tr>
<td>4. Test of pre-understandings and initial interpretations of observations</td>
<td>All</td>
</tr>
</tbody>
</table>

*Table 2.3.2.1: Protocol for interviews*

### 2.3.3 Written texts

As mentioned earlier, there may be special artefacts connected to certain types of management concepts. In relation to the workshop model, the partnering agreement and value-tree are rather important objects of analysis - both regarding content and use by workshop members. Apart from these artefacts, which can be classified as ‘natural occurring data’ (Silverman, 2006), case-study documents such as minutes of meetings, briefing documents and change proposals etc. have also been analyzed as background material. However, the content of some documents should be used with caution; for example the earlier reporting’s regarding the use of the workshop model can, in line with hermeneutic source criticism (Alvesson & Sköldberg, 2000), only be seen as remnants of the workshop model actually being applied in live construction projects. As to what happened at the workshops and the effects of applying the workshop method the reports are only to the regarded as narrating sources, which may be heavily biased by the author’s (usually the inventors) intention of promoting the workshop method (source criticism is further described below).
2.4 Interpretation

2.4.1 Hermeneutics

On a general level Alvesson & Sköldberg (2000) distinguishes between two kinds of hermeneutics: objective hermeneutics and aletic hermeneutics. Both are concerned with exploring patterns that supposedly can create a coherent, underlying meaning of data. The objective hermeneutic switches between looking at a part of the data (e.g. a word or a sentence) and the ‘whole’ which provides the context (e.g. the text, its author or the historical context) in order to discover a pattern of meaning. Within objective hermeneutics the researcher should understand the author (of the text) or interview person through empathy in order to discover the true meaning of their accounts. Consequently, within objective hermeneutics there is a polarity between subject and object which entails a form of objectivism and consequently different levels of truthfulness in research. Thus, a correspondence is to be found between the interpreting subject and the objective reality (Alvesson & Sköldberg, 2000). Source criticism, which was referred to above, when considering the ‘status’ of the written reports of the workshop model, stems from this view and will be further described below.

Aletic hermeneutics do not oscillate between part and whole, but instead pre-understanding and (new) understanding to uncover something hidden. Hence, the word ‘aletic’ is derived from the Greek aletheia which means ‘uncoveredness’ (Alvesson & Sköldberg, 2000:58). The aletic hermeneutics dissolves the polarity between object and subject and is more concerned with how the actual situation of understanding, which within this view constitutes a social constructed world, works (Alvesson & Sköldberg, 2000).

Both objectivist and aletic hermeneutics reject general rules for interpretation because exceptions “have proven to be more prominent” in the context of actual research (Alvesson & Sköldberg, 2000:58). However, it is attempted to provide some guiding principles for analysis in the following, which are based on some central hermeneutic features highlighted by Alvesson & Sköldberg (2000).

First of all, objectivist hermeneutic source criticism is relatively straightforward applicable in case-studies and can be represented by the following six bullet points (Alvesson & Sköldberg, 2000:79, No. 1 and 6 are not formulated as ‘bullets’ in the original text and brackets have been added by the author):

1. **Consider remnants and narrating sources.** Does the source offer unintentional/undistorted information (remnants) or intentional/distorted information (narrating source). Remnants are more valuable than narrating sources.
2. **Criticism of authenticity.** Is the observation genuine or fictitious?

3. **Criticism of bias.** Which is the researchers’s [or informant’s] (possible) bias [intended or not], and how can this have distorted her interpretations?

4. **Criticism of distance.** How long after the observation was made was it recorded, and in which situation?

5. **Criticism of dependence.** Can other stories, which the reporting person has listened to, possibly have influenced the structure or the content of the report (and the following analysis)? [Have the information passed through other hands before arriving at the informant?]

6. **Consideration of empathy.** What is the meaning for the acting subject and/or the ‘story’ provided (even though the information may have a weak correspondence with ‘reality’, when considering item 1-5)?

In relation to item one it should be noted – as described earlier – that a source can be a remnant when seen in one perspective (e.g. the minutes of a meeting as remnant of the meeting taking place) and a narrating source when seen from another (e.g. the minutes of a meeting as a narrating source with regard to what took place at the meeting) (Alvesson & Sköldberg, 2000). The first five bullet-points may help to assess ‘correspondence value’ to reality, whereas bullet no. 6 addresses the ‘meaning value’ of sources – both are important to consider when making interpretations. To aid the assessment of item 2-5 and specifically in relation to item 3, a range of sources (e.g. interviewees) should be used. Information from a supposedly biased source, which provide one perspective, should be supplemented with information from more ‘neutral’ or ‘counter-biased’ sources, which may provide other perspectives.

The ‘facts’ which emerge from the scrutiny of sources via item 1-5 above may then provide the building blocks (the parts) for theorizing an underlying pattern of meaning (the whole), which may be stimulated by item 6 (empathy) and by asking questions. This coherence should also relate to established interpretations, but not necessarily agree with them. Thus, the use of established interpretations or theories is a distinguishing feature that (among others) separates this approach from grounded theory, where the theory should emerge from the data. It is important that the interpretation is consistent without logical counter-arguments or contradictions in the ‘facts’. It should also relate to its context. Of course the facts derived from the source critical analysis are also interpretations, which are deemed most plausible with the available information at the given point in time (Alvesson & Sköldberg, 2000). The theorizing of an underlying meaning (the whole) may provide a new interpretation of the facts (parts), which are then reformulated in the hermeneutic circle of inquiry. The goal is to provide a deeper under-
standing of the data than what is immediately apparent. The interpreter should critically reflect on his pre-understanding and let it be transformed. In this way, the pre-understanding / understanding dialogue (aletic hermeneutics) may complement the more basic part / whole circle of inquiry (objectivist hermeneutics).

To exemplify this perspective, one could take a closer look at the terms (parts) used in the above introduction to the workshop model. The text links words such as productivity, value and user-satisfaction to words such as communication, team, trust, partnering and collaboration (this is more pronounced in ‘original’ writings about this approach – see Emmitt et al 2004, 2005). All which describes a ‘state-of-the-art’ management approach. These words may be compared to the terms often used in contemporary management literature, which are likely to be similar. This would, however, need to be substantiated via (discourse) analysis. Nonetheless, if this was the case and if an aletic social constructionist view was adopted, the ‘pattern’ could be that the prevailing understanding of the construction industry (sub-optimization, adversarial behaviour) as well as a dominant management discourse ‘works’ on the companies/inventors to propose such a ‘partnering’ initiative as the workshop model. Depending on ontology, the interpretation could also be that the companies are not unknowingly ‘steered’ by the discourse (as ‘puppets’), but uses the workshop model for marketing (we are on the client’s side). Thus, participation in the workshop and knowledge of this kind of ‘management’ can be used as a brand. One should however ‘go back’ to the written text to explore this new interpretation and see if it ‘fits’ or/and give raise to new interpretations. Accordingly, these claims/interpretations would (again) need to be substantiated via a more thorough analysis. From a source-critical point of view, the value of this interpretation, which partly is based on a text that has been written by the interpreter himself, is also questionable – here, however, it serves as an example.

### 2.4.2 Critical Theory

Critical theory is concerned with the cultural, societal context of research, especially dominating political power structures, ideologies and interests (Alvesson & Deetz, 2000; Alvesson & Sköldberg, 2000). According to critical theory the researcher should be independent of such ‘forces’ and continually reflect on his research and critical reasoning with regard to distortion caused by dominating interests. Accordingly, the aim of critical theory is to provide knowledge, which contributes to an emancipated society, by pointing at repressive institutions and ideologies. Thus, within this perspective, society can be dialectically developed through ongoing questioning of established power structures and patterns of thought (Alvesson & Sköldberg, 2000). In line with this, critical theorists (along with post modernists) often dissociate themselves from the modern capitalist society, where positivistic, scientific-technical rationality has become an in-
creasingly dominating ideology among leaders, who aim to instrumentally predict and control man and nature for the sake of productivity (Alvesson & Deetz, 2000; Alvesson & Sköldberg, 2000; Andersen & Kaspersen, 2001). It is recognized that the positivistic (Enlightenment) ideal of reasoning hold positive aspects in comparison to the earlier tradition-based society, but critical theorists see new and dangerous forms of domination and side-effects emerging from contemporary instrumental thinking (Alvesson & Deetz, 2000).

Accordingly, some theorists within this perspective can be perceived as very pessimistic. However, there are also those, who have a more positive orientation. Particularly worth mentioning, in connection to the analysis provided later on, is Jürgen Habermas, who has been quite influential in modern time (Alvesson & Sköldberg, 2000; Andersen & Kaspersen, 2001). Habermas distinguishes between the ‘system’ and the ‘lifeworld’. The system has to do with the aspects of society (the economic system and political bureaucracy) that follow “an independent objectified logic” (Alvesson & Sköldberg, 2000:116) governed by money and power with the aim of achieving functionality and effectiveness (Andersen & Kaspersen, 2001). It is a matter of system-integration where actors make strategic-rational decisions based on prediction of behaviour and resulting impact with regard to predetermined goals (e.g. money) – relatively independently of communicative consensus, social norms and reflection (Andersen & Kaspersen, 2001). In opposition to this, the ‘lifeworld’ (a term borrowed from Husserl), has to do with man’s interpreted shared experience and meaning, “that cultural horizon through which people seek to interpret and understand their situation and their environment” (Alvesson & Sköldberg, 2000:116). The lifeworld is primarily controlled and coordinated by values, social norms, moral and language. Agency is (should be) derived from communicative consensus based on recognition of reasonable, moral and sincere (linguistic conveyed) arguments – it is a matter of social integration (Andersen & Kaspersen, 2001).

According to Habermas, the ‘lifeworld’ has become increasingly ‘colonized’ by the system. As an example of this, actors’ perception of identity – something which belongs in the domain of the ‘lifeworld’ – is today heavily influenced by commercial marketing and consumption (Andersen & Kaspersen, 2001). It is claimed that this colonization has generated psychological and social problems in modern society. However, the positive, constructive idea is that this situation can be offset by a ‘rationalization’ of the lifeworld through emancipated, critical dialogue or ‘communicative action’ (communicative rationality as opposed to strategic rationality), in which undistorted well-reasoned arguments prevails that is not merely directed by the system-world logic of money and power or unreflected tradition-based values (Alvesson & Sköldberg, 2000; Alvesson & Deetz, 2000). Within this line of thought, statements should always be under suspicion for any concealed interests and ideologies. In addition, if statements are given by some
authority or expert, they should only be weighted highly if they indeed are intelligible, sincere and seem valid, not simply because of the status of the person who made them. Accordingly, Habermas distinguishes between normatively achieved consensus – where taken-for-granted perceptions are merely accepted and/or power structures are reproduced – and (emancipated) communicatively achieved consensus (Alvesson & Sköldberg, 2000).

To the researcher, this focus on power-structures and distortion of communication seems relevant when investigating the interplay between actors and their (prioritization of) values. However, as with hermeneutics, there is a shortage on guidelines regarding how to actually perform critical theoretical research (Alvesson & Sköldberg, 2000). Nevertheless, the following will provide some basic principles.

In critical theory, a phenomenon should always be seen within its historical social context – a context which is perceived as greatly influenced by dominating forces (Alvesson & Sköldberg, 2000). As a result, the researcher should ask questions like: Where do the interviewees’ opinions stem from? Can they be seen as a consequence of a dominating ideology? Are power-structures reproduced etc?

The researcher should also look inwards and reflect on why the research is being conducted and specifically the interests of any funding agencies or companies (Alvesson & Deetz, 2000, Alvesson & Sköldberg, 2000). Under the circumstances of the present industry-funded PhD it will, more than usual, be a challenge to accommodate the ideal of critical theory conducting independent critical research. Within this perspective, the sponsoring company is likely to attempt to ‘exploit’ the researcher to validate its workshop model concept.

In line with the emancipatory ideal, the researcher should likewise reveal any distortion of communication or selective understandings produced by influential actors in the local context (Alvesson & Sköldberg, 2000). Furthermore, the researcher should question taken-for-granted assumptions (and values) and problematize that which seems self-evident (Alvesson & Sköldberg, 2000). Thus, critical theory is not only concerned with the origin of any case of dominating, selective understanding, but also the contents (the plausibility) of this understanding (Alvesson & Sköldberg, 2000). As with hermeneutics, critical-theoretical analysis should be conducted in a dialectic way. However, this is not to reach a ‘higher’ level of truthfulness, but to avoid getting stuck in a single set of (established) ideas by constantly looking for counter-images (this is similar to post-modernism). Finally, theory of the unconscious (psychoanalysis) should be known to the researcher as a basis for revealing mind-constraining factors (Alvesson & Sköld-
berg, 2000). However, to limit the scope of the thesis, psychoanalysis is one aspect of the meta-theory that has not been included in the analysis.

A preliminary critical interpretation of the workshop model could be: There seems to be a discrepancy between the philosophical pluralistic view on value, described in the writings about the workshop model, and the market economy’ (the systems) focus on ‘profit’. Other ‘sorts of value’ such as aesthetic value or the value of a good working environment (process value) are acknowledged, but at the end of the day they are only justifiable as instrumental means to achieve profit or recognition (future profitability). Any espoused (altruistic) intention of contributing to client, society or people’s well-being should be met with suspicion within this context. Therefore the objective to achieve ‘client value’ may seem as an elusive ideal. Instead motivation for the workshop method may be found in pinpointing client statements regarding ‘needs and wants’ as a basis for claims when the client changes her mind later in the process (which the practitioner knows from experience is inevitable due to the nature of the conceptual development process). This may be the ‘real’ motivation behind the espoused subscription to ‘client value’ and the reason why an experienced client may abstain from adopting the workshop model (the workshop model has not been wide-spread even though it has been around for some time).

Also, within this orientation, the workshop model may be perceived as a means to control behaviour. Thus, according to Eisenhardt (1985) research suggests that there are basically two strategies to control behaviour; one is to measure (and reward) performance, the other is to minimize the divergence between preferences among actors and organizational goals. Eisenhardt draws on Ouchi (1979), who describes these two extremes as ‘market’ and ‘clan’ mechanisms, where a third category, ‘bureaucracies’, uses both performance evaluation and socialization as means to control behaviour. Accordingly, it can be argued that the workshop model (applied by management) tries to adopt both control strategies, by creating a performance measurement system (the value tree) and ‘socialize’ the actors via (partnering-) workshops in order to induce group norms and values that support project goals.

### 2.4.3 Postmodernism

The term postmodernism is used in many ways and is not a well-defined school of thought (Alvesson & Deetz, 2000). However, according to Alvesson & Sköldberg (2000) and Alvesson & Deetz (2000) there are some central themes, which characterize writings within this broad category (which also include poststructuralist writings although some authors argue that there are great differences between the two). First of all, postmodernism is concerned with signs and language, which is considered to be am-
biguous shifty and constitutes subjectivity. Focus is not on the individual person but the discursive context, which creates ‘forms and expressions for subjectivity limited in time and space’ (Alvesson & Sköldberg, 2000, p. 164). Because of the fleeting nature of language the text becomes autonomous (even from its author) and it is not, as in hermeneutics, possible to discover its ‘real’ meaning. Thus, the unproblematic acceptance of the presence of objects is rejected and the constitutive power of language is emphasized – ‘the point of view creates the object’ (Alvesson & Deetz, 2000).

Such a view – if strictly accepted – leads to a kind of ‘hyper-reality’ (Simulacra – a term coined by Baudrillard) where images become more real than physical reality (Britannica online, 2010). Thus images are seen as images of images, which can become purely self-referential (Alvesson & Deetz, 2000:104). As an example of this, one may think of the financial market which sometimes appears as without any anchor to an external reality (Alvesson & Sköldberg, 2000). The non-linguistic external world is by most postmodernist treated as ‘a kind of excess or ‘otherness' which serves as a resource for formations and also prevents language systems from becoming closed and purely imaginary” (Alvesson & Deetz, 2000:104). Thus the traditional notion of validity in research is rejected; it is not the level of ‘truth’ that is decisive, but the creativity, originality and applicability/generative nature in/of the research findings (Alvesson & Sköldberg, 2000).

Within this view, the temporary constructed world invokes different identities of the self. Subjectivity (our thoughts, emotions, self-insights, perceptions and attitudes) is shaped through the way others address us and the way we speak, which depends on the discourses that are available at any given time (Alvesson & Sköldberg, 2000). Thus an architect is not just an architect but may also be a father, a husband, and a sportsman etc – labels which also have different meanings in different contexts. Accordingly, postmodernism emphasize fragmentation and inconsistencies. Grand theories are rejected, which are seen as legitimizing narratives that are often (unknowingly) produced to benefit the dominant class (Alvesson & Deetz, 2000; Alvesson & Sköldberg, 2000). More specifically, examples of ‘grand theories’ are Darwinism, Marxism or the morally guided communicative action that is the basis for critical theory. However, as society has become more pluralistic (less guided by a few dominating ideologies), grand theories may also be understood as the local corporate ‘visions’ or management ‘ideologies’ that are created/reproduced within organization. These corporate forms of control can be understood as filling in the gap after the loss of integrative narratives on a societal level. Yet the grand theories are not unequivocal, but subjected to local interpretation, reproduction and change by its readers (the corporate members) (Alvesson & Deetz, 2000).
Alvesson & Deetz (2000) also include a specific understanding of power within the postmodernist perspective, which to a great extent can be ascribed to Foucault: Power does not reside in the individual person, but in the social formations, relations, material arrangements and normalizing ways of reasoning that ‘surrounds’ her. Particularly to this understanding, is the inseparable linkage between power and knowledge (Alvesson & Deetz, 2000, Alvesson & Sköldberg, 2000; Andersen & Kaspersen, 2001): A person who acquires a certain type of knowledge – and who may become a member of some profession or field of expertise – is thereby empowered to act based on this knowledge and is usually granted symbolic and material resources (power can be viewed as productive, which is somewhat different from critical theory). However, the person is also restricted in behaviour by the discipline in the norm – and what is understood as deviations from the norm – that is associated with such knowledge or way of reasoning. Yet, the actor also reproduces and influences the knowledge/power relationships which are in constant flux (Alvesson & Deetz, 2000; Alvesson & Sköldberg, 2000; Andersen & Kaspersen, 2001)

In summary, Alvesson & Deetz (2000:96) lists the following ideas as central to postmodernism (the list is here represented in slightly condensed version):

1. The centrality of discourse – textuality – where the constitutive power of language is emphasized and ‘natural’ objects are viewed as discursively produced
2. Fragmented identities – the discursive production of the individual replaces the conventional ‘essentialistic’ understanding of people
3. The critique of the philosophy of presence and representation – where the indecidabilities of language takes precedence over language as a mirror of reality and a means for transport of meaning
4. The loss of the power of grand narratives – emphasis on multiple voices
5. The power/knowledge connection where the impossibilities in separating power from knowledge are assumed and knowledge loses a sense of innocence and neutrality
6. Hyper-reality – simulacra – replace the ‘real world’ where simulations take precedence in contemporary social order
7. Research aimed at resistance and indeterminacy, where irony and play are preferred to rationality, predictability and order

In line with this theoretical prism, the objective of the researcher is to ‘open up the world’ working with multiple perspectives. The researcher should avoid conclusions and instead seek pluralism. Accordingly, the researcher may work with multiple ways
of data collection, seek variation in the type of informants (as in source criticism, although the aim is no triangulation) and search for ambiguity and inconsistency (to create new meaning) (Alvesson & Sköldberg, 2000). Within this process postmodernists are very concerned about representation; the researcher does not depict a reality but constructs it. In addition, because of the inescapable power-knowledge relationship (there is no innocent knowledge), one should carefully reflect on whose interests or ‘voices’ that are being reproduced (similar to critical theory). One should also consider identity work; the workshop model may for example conflict with the professional’s ‘usual’ self-image e.g. the architects’ autonomy to choose the best artistic solutions. Which identities are invoked? Is it the artist, the collaborative professional or the salesmen?

Building on the hypothesis that the workshop model can be seen as an effect of a contemporary management discourse, it would also be interesting to see if this (asserted) discourse then reproduces itself in the managers ‘story lines’ in interviews, constituting their identity as managers. Within this perspective, it may furthermore be interesting to see how the ‘norm’ (collaborate, communicate, optimize) may work as a discipline. Thus, one could maybe build a contrasting argument that, although the goal is value optimization, the workshop model only works to legitimize inconsistent compromises that are put together in the process of ‘collaboration’ between various stakeholders/project participants (with their contrasting, fleeting interpretations of value and codified languages). Accordingly, the notions of ‘client value’ and ‘collaboration’ may work as discursive constraints, which inhibit (discipline) novel, consistent, complex and artistic thinking and in this manner value creation from a wider perspective. Of course this would easily lead to an assessment of what is ‘better’ value, which is something the postmodernist writer should abstain from.

It can be said that the postmodern view is represented within the present metatheoretical principle of exploring multiple interpretations. The use of multiple theories can be viewed as a postmodern methodological ‘instrument’ that seeks to create a pluralism of perspectives to invoke creativity (Alvesson & Sköldberg, 2000). However the aim is to ‘qualify’ preferred interpretations and suggestions for development of value management practice, which is in contradiction to the postmodern ideal. However, post modernists do not believe in predictive theories and therefore the aim of research cannot be to ‘correct’ imperfection (as in critical theory). It is rather a matter of providing interesting alternative readings and uncovering hidden conflicts (Alvesson & Deetz, 2000).

4 Instead, when all perspectives are used, Alvesson & Sköldberg (2000:248) name their approach “quadri-hermeneutics”.

2.4.4 Overview of the three perspectives contribution to the analysis

Table 2.4.4.1 below outlines the contribution of each orientation to the case-study analyses. This is of course a crude simplification of the three perspectives and it should also be stressed that the theories overlap. There are for example great similarities between Critical Theory and Postmodernism in their attention to the social/political construction of knowledge and social relations (Alvesson & Deetz, 2000). However, together with the above preliminary interpretations, it may illustrate the value of reflexivity between the orientations in that it in fact is generative in highlighting different relevant aspects of the phenomenon that is being studied.

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Hermeneutics - coherence</th>
<th>Critical theory - power structures</th>
<th>Post-modernism - divergence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevance</td>
<td>▪ The usefulness of empirical data is critically assessed through source criticism.</td>
<td>▪ Focuses on power-structures, interests and ideologies (e.g. when prioritizing values).</td>
<td>▪ Focuses on identity and institutionalized, discursive values.</td>
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<td></td>
<td>▪ Relates established theories (interpretations) of designing and value to empirical data</td>
<td>▪ Draws attention to moral and social values, including the historical/social/political context.</td>
<td>▪ Points at inconsistencies as a basis for continued dialectics/discussion.</td>
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<td></td>
<td>▪ Provides a dialectic structure (the hermeneutic circle of inquiry)</td>
<td>▪ Questions taken-for-granted assumptions.</td>
<td>▪ Draws attention to the subjective representation of research findings.</td>
</tr>
</tbody>
</table>

Table 2.4.4.1: Overview of the contribution of the meta-theoretical orientations in relation to the analysis performed in this thesis

Accordingly, although the focus of the research is broader than the workshop model, the above initial interpretations – as an example – give rise to more critical questions, which may bring more ‘tension’ into the research (Alvesson and Sköldberg, 2000):

a. What are the interests of the designers (architects and engineers) as well as contractors’ to engage in the workshop model? And why may they not be motivated to participate or contribute to ‘client value’?

b. What may compromise construction clients’ capability and motivation to express their values and needs in the conceptual phase of construction projects?
c. Is client value an ideal and/or discoursive trap?

These questions have been used as hypothesis and pre-understandings to be explored as sub-questions to the overall research questions in the interview-guide and when analyzing the case-study where the workshop model has been applied. Accordingly, within the explorative-integrative case-study approach, the researcher should initially describe her own pre-understandings as a tentative scenario of what she will expect to see in the field (Maaløe, 2002:128).

2.5 Criteria for good research

In natural science good research seems closely related to the notions of validity and reliability. Here reliability means the extent to which an experiment has been conducted with ‘truthful’ information and experiment procedures have been followed strictly. Other researchers should be able to conduct the same experiment with the same result. However, in order to give a valid answer to a given question, the right procedures should be chosen and the right type of information should be utilized. Accordingly, the notions of reliability and validity connect to a science ideal about ‘mirroring’ reality, which is associated with ‘empiricist’ research. However, as described initially, if one adopts a social constructivist viewpoint, this ideal seems naïve – especially in a social science context. Instead one may adopt the viewpoint that research should be practical useful. This, however, limits research to that which is considered useful by dominant groups and devalue descriptive knowledge e.g. about history and culture (Alvesson & Sköldberg, 2000). Another criterion could be that research should make new, alternative understandings possible. This seems, however, to be a rather ‘loose’ criterion, while at the same time being difficult to adopt, since it is very hard to assess whether the criterion has been met (Alvesson & Sköldberg, 2000). Instead Alvesson & Sköldberg (2000) again point a pragmatic middle course, where empirical material is used as an argument – not as proof. More concretely they suggest that good research is characterized by the following five features (Alvesson & Sköldberg, 2000: 276):

1. Empirical ‘arguments’ and credibility
2. An open attitude to the vital importance of the interpretive dimension to social phenomena
3. Critical reflection regarding the political and ideological contexts of, and issues in, research
4. An awareness of the ambiguity of language and its limited capacity to convey knowledge of a purely empirical reality and awareness about the rhetorical nature of ways of dealing with this issue (the representation-authority problem)

5. Theory development based on the mentioned issues

Item 2, 3 and 4 follow from the adoption of the three meta-theoretical lenses. Regarding credibility (item 1), Silverman (2006) argues that it can be obtained through ‘appropriate’ methods and ‘objective’, rigorous and critical handling of data. In this PhD project emphasis will be on the term ‘critical’ via the use of multiple (opposing) orientations within the analytic framework. ‘Objectiveness’ is inherently problematic if one adopts a social constructionist view, however the researcher will seek to be explicit about the data (that will be thoroughly transcribed), what methods are used and why some interpretations are preferred over others; thus, leaving it up to the reader to make up her own mind. Rigour can be accomplished via a theoretical informed analysis as opposed to common-sense interpretation. However, if the research can result in some surprising new interpretation (to the researcher and the reader), which can also be accepted by the industry partner and (not least) challenge current theory (item 5) and practice – a lot would be accomplished.
3 Context of the research: The construction industry

A part of the methodology is to reflect on the context of the research. Accordingly, in the following it is briefly argued that the current research is situated within a widespread user and client value paradigm. Subsequently the construction process is described as it is commonly perceived by researchers and practitioners. The latter also provides a ‘map’ that will be referred to henceforth to avoid confusion in relation to country specific terminology of project phases. However, if the reader is very familiar with the construction industry, and the current discourse, it may be sufficient to read the summary in the end. The relevance of the chapter in relation to the overall research design (figure 2.2.3.1) is highlighted below:
3.1 The client and user value trend

The goal of construction is to provide value to the client, stakeholders and end-users. This appears to be a well-established ‘fact’ in various construction research publications (e.g. Thomson et al., 2003; Macmillan, 2006; Zemke and Pullman, 2008) and is also reflected in management concepts such as value management (e.g. Kelly et al., 2007) and lean construction (e.g. Ballard et al., 2007). Accordingly, within a UK context, Thomson et al. (2003:335) state that: “Government and industry initiatives are...championing the cause of focusing on customer value” and provides numerous examples to support the statement. Six years later the same authors in Mills et al. (2009:473) again ascertain that “value is certainly topical”.

Green (1996) argues that the focus on customers and users was spurred in the 1990ies as a result of a change in market conditions: Whereas the 1980ies were dominated by developers, a shift occurred, with the UK recession in the late 1980ies, towards greater influence of owner-organizations. However, Thuesen et al. (2009) argue that the “Customization paradigm” was already spurred in the 1980’ies, led by influential architects such as Jean Nouvel and Frank Gehry, in opposition to the 1950s and 1960s “Mass Production paradigm”.

Without specific focus on construction, it can also be argued that the quality management wave of the early 1990s led to a “customer is king” exhortation in the UK (Daniels, 2000:67). However, Woodruff (1997) suggests that the focus on quality improvement and internal process improvement, in the manufacturing industry of the US, led to an unfortunate internal orientation, which subsequently has spurred an outward focus on customer value (to gain a competitive advantage). Woodruff (1997:149) states: “there are no shortages of calls for organizations to reorient strategy toward superior customer value delivery”.

Similarly, Gann et al. (2003) and MacMillan (2006) suggest that the development in the UK construction industry was a spin-off of the intensive focus on construction process efficiency that followed the well-known ‘Egan Report’ (Egan, 1998). Thus, concerns were raised that the first wave of performance-measurements that primarily was concerned with time, cost and ‘waste’, neglected design quality and would result in unattractive buildings. This led to a new wave focusing more on quality and value of design (Gann et al., 2003). This included increased recognition of the potential productivity gains and (lower) whole-life-cycle cost of well designed buildings (MacMillan, 2006).
In Denmark a parallel development took place in the 1990s, where government initiatives were instigated to stimulate productivity in the construction industry (Kristiansen et al, 2005; Gottlieb, 2009). Concepts like Partnering and Lean construction gained momentum, which, among other things, led to the development of the workshop model. Furthermore, it is noteworthy, that the concurrent focus on collaboration, manifested in the partnering movement, also, both in Denmark and the UK, has been ‘fused’ with the value-agenda in a more recent focus on values (Mills et al, 2009) and values-based management (Wandahl, 2005).

An example of the current Danish discourse is provided in Vision 2020, which is the output of an initiative taken in 2006 by the Danish Enterprise and Construction Authority that invited a group of top managers and researchers to provide guidelines for the development of the Danish construction industry. Here the slogan was ‘meaningful construction’ and it is stated that:

*Meaningful construction’ is a concrete suggestion as to how the construction industry – by working in a meaningful way – can become more valuable to the individual user (EBST, 2006a:6).

Another example is a large government programme called user-driven innovation, which in the period 2006 to 2010 granted almost 270 million DKK to various projects across industries. One of the projects, within this programme, called Virtual Innovation in Construction, aimed to deploy ICT as a tool for user-involvement in the design process. Accordingly, on the project web-site it is written:

*The building design and erection process is all about creation of a product that within established budget lives up to the expectations of the end-user and owner. (Vicspace, 2010)*

In a government status report on user-driven innovation in construction, it is explained that the focus on user-driven innovation among other things should be seen as a strategy to meet a global market with increased competition (particularly from countries with a lower-paid workforce). It is however claimed that user-driven innovation is different from user-involvement as such. User-driven innovation aims to develop innovative solutions with a long term perspective, based on an improved understanding of common user-needs – not requirements from a few individuals (EBST, 2006b:32).

In addition, the Danish client association has (not surprisingly) also been very active in promoting the client/user value slogan. Accordingly, in 2006 the secretariat director stated:
“The industry’s greatest challenge is to figure out how to create more value for the construction-users based on an enhanced understanding of requirements, wishes and needs” (Ingeniøren, 2006, authors translation).

However, the most obvious example of the current discourse is the programme “Værdiskabende byggeproces” (Value-creating building process), which was initiated in 2007 by the Danish client organization together with six of the most influential professional organizations that represent all actors in the construction industry. The stated purpose of the programme is to develop practical tools that enable “higher levels of value delivery”. In addition, it is stated that: “the work is to ensure that the values in construction are maintained throughout the whole project” (Værdibyg.dk, 2010, author’s translation). This reflects a common understanding of values as something that can be made explicit in the briefing phase and almost as an entity can be “lost” in the subsequent phases.

Except for the quality and lean movement, other trends within management may have encouraged the current paradigm in construction. Within the ‘original’ field of management studies, organizational theory, two perspectives seem particularly noteworthy – that is the shareholder perspective and stakeholder theory.

The business community widely considers shareholder value as the performance criteria for organizations (Scott & Davis, 2007:328). Setting aside branding and other activities decoupled from ‘actual’ performance, one means to achieve this is by providing customer value at the lowest cost to maximise profit. Thus, Jensen (in Scott & Davis, 2007:332) provides the argument that “value is created when a firm produces an output or set of outputs that are valued by its customers at more than the value of the inputs it consumes...Firm value is simply the long-term market value of this stream of benefits.” This intuitive link between customer value and shareholder value also underpin the workshop model.

In somewhat opposition to the shareholder view, stakeholder theory, which emerged during the 1980’ies (Donaldson & Preston, 1995), suggests that companies need to accommodate all stakeholders (Scott & Davis, 2007; Vilanova, 2007). A stakeholder is defined by Anacona (in Scott & Davis, 2007:188) to be the “Social actors (meaning groups of individuals or other organizations) who play a role in the survival and success of the organization and who are affected by the organization’s activities”. The question of who feels ‘affected by’ an organization is not up to the organization to determine and so Donaldson & Preston (1995:67) highlight that “Stakeholders are identified by their interests in the corporation”. The workshop approach implies that all ac-
tors should be heard, although their stake is not equally prioritised. Customer value comes first. Likewise, within the stakeholder perspective, some scholars argue that managers ought to evaluate stakeholder saliency (Reynolds et al, 2006; Vilanova, 2007). Specifically this evaluation may be based on stakeholder power, legitimacy and urgency of the stakeholder claim, to assess what really matters (Mitchell in Reynolds et al, 2006). According to Donaldson & Preston (1995) the second variable, legitimacy, is a key notion in stakeholder theory because there are no solid evidence of any linkage between stakeholder management and (financial) performance (Donaldson & Preston, 1995). Instead stakeholder theory is justified through its normative character. Thus Donaldson & Preston (1994:87) concluded that “the ultimate managerial implication of the stakeholder theory is that managers should acknowledge the validity of diverse stakeholder interests and should attempt to respond to them within a mutually supportive framework, because that is a moral requirement for the legitimacy of the management function.” [Emphasis is changed from italic to bold by the author]. This normative aspect (and argument) also applies to the workshop model – managers and organizations in general should take into account especially the client and users’ values.

Finally, if one adopts a sociological perspective, one may see the current focus on client value as an effect of what Anthony Giddens describe as the post-traditional society (Kaspersen, 2001). In modern society, traditions are constantly being questioned and infringed. Therefore traditions cannot provide solid norms and values. Increased reflexivity is prevalent as well as a recognition of the limitations of “expert-systems”. Accordingly, there is no certain knowledge and all conditions for social relations are to be negotiated – they cannot merely be based on tradition without any other legitimation (Andersen & Kaspersen, 2001; Kaspersen, 2001). This for example aligns with the notion of the partnering agreement and the establishment of ‘process values’. The scepticism towards expert-systems also undermines the traditional authority of the architect or engineer as autonomous omniscient creators of buildings – the customer should be involved and have a say. Accordingly, customer value may work as legitimizing ‘guiding star’ in the absence of sure knowledge and tradition (this interpretation is also inspired by Gottlieb’s (2009) description of the negotiation paradigm).

3.2 The construction process

3.2.1 General considerations

A common way of describing the construction process is by means of process models. In the following, a construction process model is understood as a description of a sequence of project stages that involve certain activities and tasks, which ought to be un-


dertaken to transform information and resources into construction results. According to Winch & Carr (2001) process models are to be distinguished from process maps, which are descriptions or interpretations of what actually happens in a (project-) organization. Hence a process model can be viewed as an idealized description of a rational problem-solving process, which is used as a management tool for coordination and standardization. As stated earlier, process models are interesting in the present research because they represent some basic assumptions about the construction project process and the activities needed in order produce a building artefact. Thus, they may also represent a useful abstraction of the overall problem-solving process, to which recommendations can be mapped, even though a linear, rational process is unachievable in practice. In appendix 1 process models are described as a design management tool.

### 3.2.2 General process models: The whole project perspective

There are countless different process models, given that many companies develop their own representation of operations. However, the following analysis is delimited to five more general descriptions representing national process models in Denmark, UK and the US. Overall, the models were chosen because most of the management literature, used within this research project, derives from these three countries.

The first process model is the “Description of services: Building and Planning, 2006” developed by the Danish Association of Architectural Firms (DANSKE ARK) and the Danish Association of Consulting Engineers (FRI), which by its nature have great focus on architectural and consultant activities and less focus on client, contractor and supplier related activities. However, in spite of this bias, it is considered to represent the predominant view of the building process in Denmark. In the UK reference is often made to the The Royal Institute of British Architects’ (RIBA) plan of work. However, in the present analysis an up-dated outline of this, RIBA’s Outline plan of work, 2007, has been chosen to represent the UK construction industry. This process model is of course also biased towards architectural services. However, in 1995-1998 researchers at Salford University designed the Generic Design and Construction Process Protocol (GDCPP), which was developed through action research and was meant to represent all actors in the (UK) construction industry and provide a common framework (Kagioglou et al, 2000). The GDCPP is presented here, because further detailing and development of the GDCPP has been conducted since 1998, and as such it represents state-of-the-art research into construction processes. However, it is biased in the sense that it, to a greater extent, depicts a desirable future state – it is more “to-be” than the aforementioned models. Likewise, the American Institute of Architects (AIA) and the AIA California Council have recently developed a guide to Integrated Project Delivery (IPD), which describes a new project delivery approach that, according to the AIA, can facili-
tate collaboration and high performance in construction projects. For comparison a textbook depiction by (Kavanagh et al, 1978) of a more traditional American construction process has been included. However, this is biased with a construction management perspective, which emphasizes cost control and assessment of project feasibility.

A common contextual framework and its limitations
An analysis has been made of the activities included in each model to look for similarities. Out of initially 57 categories of activities 38 was constructed and chosen to represent common activities, which are included in at least four of the five process models chosen. These common activities can be seen in figure 3.2.2.1 below as well as their ‘placement’ in the sub-phase categories of each of the process models. This representation is of course a crude simplification of the process models. Thus most of the process models have overlapping and repetitive activities (e.g. “Quality assurance and follow up on performance metrics”), which cannot be accurately illustrated in this simplified linear representation. Especially the process protocol (GDCPP) and the IPD approach have recurring activities, which illustrates the iterative nature of the problem solving process (this is to some extent illustrated with the concurrent sub-phases in the pre-project phase of the process protocol and in the design phase of the IPD approach, where a simplified, linear representation was considered to be too misleading). In addition these two process models emphasize the need for a common framework for all actors and therefore a great part of the model descriptions are concerned with the specific responsibility of the different actors, which is not illustrated in figure 3.2.2.1. Also, one should keep in mind, that the categorizations of activities are constructions of the interpreting mind of the researcher looking for similarities across the different process models. Thus, the representation might look very differently if one was looking for differences. In addition, concepts such as ‘quality assurance’ and ‘risk analyses’ presumably have diverse meanings in different countries and may include quite different activities.

Another problem, when trying to compare the models in this manner, is the different level of detailing in descriptions. Accordingly, Tzortzopoulos et al (2005) found that, broadly speaking, two levels of detail can be found in the literature, which can be categorized via the earlier distinction made between (detailed) maps and (less detailed) generic models. As a result, some more or less important activities may seem to be absent in some of the models, even though their creators recognizes that these details are in fact a part of the construction process and would include them in a more detailed description (this is more than likely when looking at RIBA’s Outline plan of work, 2007). Therefore, one should pay more attention to the activities that are actually included in most of the models, than any particular activity, which is not explicitly included in the specific description used. Finally, the representation of the process models depicts a
classic design-bid-build structure even though all models recognise other procurement strategies. In spite of this, most construction projects do in fact include some sort of bidding prior to site production – at least when it comes to peripheral sub-contractors or suppliers, who are not central to the task. This explains why this ‘tender phase’ (item 25-27) is also included in the IPD approach, even though it promotes early involvement of contractors and suppliers.

Regardless of these limitations to figure 3.2.2.1 a clear overall pattern is illustrated. Hence, all except one (RIBA’s Outline plan of work) are divided in four overall phases: (1) an early pre-design phase followed by (2) the design phase which leads to (3) site production (construction) followed by a (4) post-completion phase. By and large the design phase can furthermore be divided into three or four sub-phases: (2a) the early conceptual design phase, (2b) a development phase and (2c) a detailing phase which can be split into two phases; (2c1) one concerning design detailing for statutory review and (2c2) one for construction and competitive tendering. The process models contain more or less formal gateways (which are not shown), where a project review and approval procedure is performed by the end of each phase before entering the next phase. The overall stages are summarised in figure 3.2.2.2.

As it can be seen from figure 3.2.2.1 the first phase is about establishing the need and the (financial) boundary conditions for the client as well as identifying preconditions and setting up the project organization. The next phase is about design professionals giving a responds to the client request; first, some outline proposals are made followed by a more integrated design, where both architectural and technical qualities are considered, leading to the detailed design (production) for statutory approval and construction documents. As the design is becoming increasingly specified further detailing of budget, cost plan and schedule is performed. This is the responsibility of the general contractor or project manager during the initial stages of the project and/or it provides the basis for competitive tendering in a design-bid-build approach. Also, ongoing dialog with authorities is taking place during all project phases. The third phase, where most of the work gets done at the construction site, is not the main focus area of this project and only few activities are listed in figure 3.2.2.1. These primarily concern information exchanges between designers and constructors as the drawings and descriptions are being translated into physical objects. The fourth phase is mainly concerned with occupation of the building artefact as well as inspection and performance evaluation.
Figure 3.2.2.1: Common activities in construction process models

<table>
<thead>
<tr>
<th>Process</th>
<th>Design</th>
<th>Pre-Construction</th>
<th>Post-Construction</th>
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<tr>
<td>Preliminary</td>
<td>Design proposal</td>
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<tr>
<td></td>
<td>Preliminary design</td>
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<td>Detailed design</td>
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<td>Final design</td>
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<td>Contract documents</td>
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<td>Safety plan</td>
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**State-of-the-art deviations from the common framework**

Figure 3.2.2.1 and 3.2.2.1 provides an overall and common description of the construction process. However, especially the GDCPP and IPD approach claim to provide some novelties in spite of the common characteristics. These state-of-the-art ‘deviations’, will briefly be presented in the following to put the common framework into perspective.
**The Generic Design and Construction Process Protocol (GDCPP)**

The espoused innovative features of the GDCPP are the “whole project view” which by and large means greater consideration of the ‘fuzzy front end’ as well as post-construction activities, the co-ordination and early involvement of key actors including contractor and facility management representatives (the ‘stakeholder view’), the adoption of the New Product Development (NPD) stage gate approach for consistent planning and performance measurement, ‘progressive fixation’ (not freezing) of design, learning and improvement, and the use of IT to support the process protocol (Kagioglou et al, 2000; www.processprotocol.com). This corresponds with the activities, which are not proper illustrated or even left out of the common framework presented in figure 3.2.2.1. Thus, looking specifically at the GDCPP it shows the responsibilities of the different actors grouped in eight ‘activity zones’, with the aim of achieving a coordinated effort and great attention is paid to stakeholder analysis and the development of a communication strategy (this activity did only occur in three of the five process models). The conceptualization of ‘activity zones’, describing responsibility that can be undertaken by multifunctional teams within the project organization, can be seen as a novelty compared to traditional functional distribution of responsibility on actors categorized by profession as architects, structural engineers etc. Taken into consideration that these traditional role categories often have changing responsibilities on different projects, the aim is to reduce ambiguity. In continuation of this, the definition of a process management and a change management activity zone to respectively co-ordinate work throughout the process and keep track of information/changes, can be seen as a distinct aspect of the GDCPP. It is also noteworthy that activities concerned with tendering (item 25, 26 and 27 in figure 3.2.2.1) are not included in the process protocol – presumably because contractors are thought to be involved from the very beginning of the project(s). The recurring of many activities (item 4,5,6,9,10,12,14 and 36) in different phases represents the fuzzy, iterative nature of the early project stages and the endeavour for consistent, ongoing evaluation and improvement. In addition the process protocol has been developed as an IT toolkit for process management. Accordingly, one may sum up the espoused innovative principals with the following key words: Holistic view, stakeholder involvement, co-ordination, team-work, consistency, performance evaluation, learning, communication and IT. The problem diagnosis which the GDCPP aim to address is accordingly complex, fragmented, uncoordinated and highly variable construction processes (Kagioglou et al, 2000).

**The Integrated Project Delivery (IPD) model**

The espoused innovative elements of the IPD approach are: shifting design decision “forward”, the adoption of Building Information Modelling (BIM) tools and early involvement of constructors, regulatory agencies and suppliers (AIA, 2007:22). The rea-
son for moving design decisions upstream is (1) the greater ability to impact costs and (2) the significant costs associated with late design changes. Basically it means that greater effort should be made in the early stages to avoid costly changes during the site production stage. However, one may comment that changing the phase definitions, “moving” activities upstream, does not change anything (but the phase definitions) as long as the activities are the same – this is presumably why a diagram is presented in the description of the IPD showing “greater effort” in the early stages compared to a traditional phase model. The actors are to be “persuaded” to make this greater involvement in the early stages by means of reasoning and mutual benefit and reward compensation structures. BIM, which is also mentioned as a focus area in the IPD model, is an IT tool, which links project information to a 3D model. Thus, BIM provides an information platform for co-ordination of design as the project progresses and it can be used after construction completion as a facilities management tool (AIA, 2007). The reason for early involvement of constructors, regulatory agencies and suppliers is to achieve better co-ordination ‘in advance’ of site production. Also, one may note that item 9 (consider time-frame/process execution plan) and item 14 (Quality assurance and follow-up on performance metrics) are repeated in the subsequent (three) IPD phases. This again illustrates an emphasis on continuous performance evaluation. However, distinct from the process protocol and the other phase models, the IPD approach describes in more detail the responsibility of the client/owner in each sub-phase. In addition the IPD distinguishes itself by explicitly including “soft system thinking” activities such as facilitation of goal realignment and team buy-in. In a review reported in Macmillan et al (2002), it was found that most process models do not attend to social aspects of team-work. Also, the IPD approach pays more attention to specific contractor and supplier related activities such as applying for construction site related permits and placing orders for prefabricated, long lead-time materials etc.

In spite of these differences, which may be due to greater detailing in the IPD description in general, the perceived pillars of success can be summarized by almost the same words as it was the case for the GDCPP: Front-end loading, involvement, co-ordination, team-work, performance measurement, communication and IT. Corresponding to this, traditional practice is seen as fragmented and inefficient, bringing results way below expectations (AIA, 2007).
3.3 Summary

In this chapter it was argued that the research takes place in, and is probably an affect of, a prominent “customer is king” management trend. The emergence of this trend may be seen as a countermove to an earlier focus on internal process efficiency/cost-reduction. Specifically looking at the construction industry, it may also be seen an effect of market conditions, as well as developments in other industries and management tendencies (e.g. stakeholder theory, quality management). From a more sociological perspective, it was also suggested, that the use of customer/client value as an overall guiding star, may be perceived as an effect of the post-traditional, reflexive society described by Anthony Giddens.

In addition to this, five construction process models were reviewed, which showed a common perception of the construction project process (at least in Denmark, UK and the US). Depending on ontology this would suggest that either the discourse is strong and/or the description of common activities do in fact reflect practice and a reasonable way to structure the process.

The comparison also illustrated similarity between the two most “to-be” orientated models regarding the perceived necessary changes that should be made to “usual practice”. The following buzz-words were identified: stakeholder involvement, team work, coordination, performance measurement, communication an ICT.

These findings provide a background to – and framing of – the research project.
4 Theory

The theory chapter is divided into three sub-chapters describing respectively: (1) value theory, (2) theory of designing and (3) communication and group dynamics theory. These are descriptive theories, which have been separated from the more instrumental management concepts that follow in chapter 5. As it is argued in the method chapter, the theories, contained within this chapter, provide important background knowledge for interpreting the case-studies (in addition to the analytical meta-theories). The theories are, however, also central to the synthesis and conclusions. In order to understand the case-study analyses the reader is therefore advised to read these chapters. However, if the reader is already familiar with some of the theories, he or she may prioritise reading the summaries at the end of each sub-chapter. The relevance of the chapter in relation to the overall research design (figure 2.2.3.1) is highlighted below:
4.1 Value and Values Theory

Even though most people have a feeling of what is meant by the term “value”, it seems to be difficult to formulate a common definition. Value is often associated with monetary value, representing the economical view of market exchange value. However, value can also be looked at from a more philosophical point of view which to a great extent complicates the conception of value. Accordingly, there is vast amount of literature that dates back to Vitruvius and even Aristotle (Johnson, 1939; Korsgaard, 1986), but it reveals no commonly accepted definition of value. It seems that an extensive review of value theory would encompass research for a thesis of its own. A concise review of value theory is provided below as a basis for operationalizing the concept in a management context; it is considered whether value is subjective or objective, intrinsic or time and context dependent and whether it is measurable at all. In addition, the more psychological aspects of (personal) values and behaviour will be outlined as well as some distinctions to related notions such as attitude, norms etc.

4.1.1 Value from a philosophical point of view

Subjectivity vs. Objectivity

Looking for a generic definition of value, Perry (1914) argues that value consists in the fulfilment of interest. In this case Perry uses the term interest to mean “a subject’s liking or disliking” and thereby suggests that value is subjective. However one could argue that for example “goodness” and “beauty” are objective values that nobody can disapprove. This is according to Moore (1922) the strongest argument against the “subjective view”. Korsgaard (1986) describes the subjective view as an acknowledgement of the dependency of human interest in most things that are considered to be good. According to Korsgaard (1986) the advantage of the objective view is that it acknowledges that it is only human to make a false judgement of what is good and that humans sometimes desire things that are not good – therefore it should be possible to ascribe the good to the object itself. However Moore believes that the discussion about objectivity and subjectivity is really about the existence of intrinsic value. Moore argues that in some cases the assessment of one object being better than the other can indeed be made objectively, however the assessment usually depends on the context, which can change and thereby cause an alteration of the initial judgement towards the opposite (Moore, 1922). The question is; does intrinsic value exist that consequently does not depend on context? This is interesting not only for the sake of clarification, but also because intrinsic value can be viewed as representing a higher degree of value than extrinsic value that is conditional of its relational properties.
Intrinsic, extrinsic and instrumental value

In Moore’s famous work Principia Ethica (1903§112) he states; “in order to decide the question “What things have intrinsic value”...it is necessary to consider what things are such that, if they existed by themselves, in absolute isolation, we should yet judge their existence to be good”. Not only does this serve as a definition of intrinsic value but also highlights a frequently perceived relationship between value and “goodness”. Kant (1785) wrote that the only thing that is good in itself is “good will”, which has been interpreted by some researchers to be a statement of intrinsic value (e.g. Bradley 2006, SEP 2007). Likewise the Stanford Encyclopedia of Philosophy (SEP, 2007), states that intrinsic value refers to a particular way of being non-derivatively good. Later on in 1922 Moore developed his definition of intrinsic value:

“A kind of value is intrinsic if and only if, when anything possesses it, that same thing or anything exactly like it would necessarily or must always, under all circumstances, possess it in exactly the same degree”. (More, 1922:265)

Hence intrinsic value must be “objective” though the opposite implication is not always true given the possible dependency of context (Moore, 1922). Therefore regarding value as subjective (by definition) implies that value cannot be possessed by an object itself, which therefore excludes the existence of intrinsic value.

Opposed to intrinsic value is extrinsic value that is to be defined simply as value that is not intrinsic value (SEP, 2007). Extrinsic value has often been associated with instrumental value which is the value that something has in virtue of being a means to an end (SEP, 2007). Money can be viewed as having instrumental value because they are indeed an instrument to buy an object or experience, but the money seen in isolation does not possess much value. However it can be argued that instrumental value is a subcategory of extrinsic value (Smith 1948, SEP 2007). Smith, 1948, refers to economical value-theory in which labour-cost theory and labour-command theory represents two different perspectives on value. According to labour-command theory value (or price) is equivalent to the quantity of labour that it enables its possessor to purchase or command, thus comparable with instrumental value in the sense that it represents the utility value of a commodity (Smith, 1948). Opposed to this is labour-cost theory in which value (or price) is equivalent to the amount of labour necessary in order to produce it. This is according to Smith another kind of extrinsic value and he exemplifies this with a gift that only has value in virtue of the person who gave/made it – a person that the receiver of the gift holds dearly. Accordingly, Smith points out that if one values an object for its own sake it is not necessarily intrinsically valuable, since it may be a subjective valuation that is not tied to the object in isolation (Smith, 1948). Therefore it is to be

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regarded as extrinsically valuable even though it is not instrumental – extrinsic value is about context dependency.

The concept of intrinsic value implies to some extent the involvement of metaphysics that determines value that is unchangeable and universal. This does not comply with a naturalistic or positivistic point of view which according to Moore (1922) is a fundamental reason for those who oppose the concept of intrinsic value. However, Perry (1914:155) argues that intrinsic value is possessed by “the total complex object-in-relation-to-interest”. Perry (1914:155) distinguishes between whether “the subject of the judgement may stand in the relation, or contain the relation” and uses this categorisation to distinguish between “intrinsic” and “extrinsic” value thus arguing for a coexistence of the subjective view and intrinsic value. Kelly (2007) explains Perry’s view by giving an example of a person admiring a neighbour’s yacht and therefore obtaining value from it without being a part of the object-interest complex, which according to Kelly would require an ownership of the yacht. The yacht seen in isolation has extrinsic value, but the interest-complex, which contains the neighbour, has intrinsic value. Hence this view on intrinsic and extrinsic value is grounded on a classification of relationships (e.g. ownership) that creates the borders of the object-interest complex.

Another less abstract view of intrinsic value is associated with respect for certain intrinsically valuable things or creatures such as humans, historical artefacts and nature (Bradley, 2006). Bradley, 2006, categorises this view as the Kantian view (inspired by Immanuel Kant) as opposed to the Moorean view, which according to Bradley are the two most influential viewpoints within this subject matter. An opposing argument to this example of the Kantian view (e.g. people as intrinsically valuable) could be that it is an example of a subjective assessment that is collectively accepted and therefore seems intrinsic even though it is not (argument inspired by Perry, 1914). However Bradley argues that the Kantian and Moorean views can supplement each other as being different concepts to fill different theoretical roles in the moral theory; the Moorean view aims to determine what things that are/brings value to life by their mere existence and the Kantian view provides at perspective that defends how e.g. animals and people are treated (Bradley 2006, SEP 2007).

Rice (1943) distinguishes between two other kinds of intrinsic value; the conative source of value and the perceptual source of value. The conative source of value is associated with the joy experienced within the process of accomplishing any purpose (Rice, 1943: 341). The experienced gratification comes from the release of the tensions involved within the process of attaining our interest. Consequently the gratification can also be obtained through accomplishment of subordinate goals towards the final goal. Rice refers to games as an example of people striving for this kind of intrinsic value –
given the argument that the enjoyment through problem-solving in a game is not to be characterised as an instrumental value, since the accomplishment of solving the game has no usefulness in itself. However one could argue that if one is winning over other participants this can be regarded as instrumental value in the sense of obtaining admiration and status. The idea of conative value complies with an observation made by Smith (1948), regarding economic theory, in which scarcity have a positive influence on value – it may be due to the fact that a scarce object or experience is harder to come by, hence the gratification of attaining it is greater. The perceptual kind of intrinsic value is experienced, even though we may not strive for it deliberately, and it brings (unexpected) enjoyment through its mere presence. According to Rice, it is mostly seen in aesthetic experience (Rice, 1943: 342). Rice comments on Perry’s definition of value that “the fulfilment of interest” includes some kind of expectation, which is not consistent with this kind of value. Peoples immediate response to perceptual value is, however, to maintain it, which according to Rice introduces an element of the conative source of value that complicates the distinction between the two.

The discussion of intrinsic and extrinsic value can also be found in the work of Aristotle who argues that “if we do not choose everything for the sake of something else [instrumental value] (for at that rate the process would go on to infinity, so that our desire would be empty and vain), clearly this must be the good and the chief good” (Aristotle, book 1 paragraph 2) and he suggests that happiness through the activity of contemplation is this chief good (Aristotle, book 10 paragraph 8) or as interpreted by Korsgaard, 1986, “the source of value” which brings purpose to life. Aristotle describes this “chief good” as a final end without qualification, which can be interpreted as a form of intrinsic value. Aristotle makes the following categorization:

“Now we call that which is in itself worthy of pursuit more final than that which is worthy of pursuit for the sake of something else, and that which is never desirable for the sake of something else more final than the things that are desirable both in themselves and for the sake of that other thing, and therefore we call final without qualification that which is always desirable in itself and never for the sake of something else.” (Aristotle, book 1 paragraph 7)

What is interesting to this discussion about intrinsic and extrinsic value is that Aristotle acknowledge that not only can we desire something for the sake of something else (instrumental value) or for the sake of itself without qualification (intrinsic value), but it is also possible to speak of things that are desirable both in themselves and as a means for something else. Korsgaard, 1986, exemplifies this with the architect who takes joy in his work, not only because he earns money or for the benefit of the customer, but also because of the mere joy of creation. Korsgaard, 1986, describes this kind of value as
conditional, which makes it extrinsic, but not purely instrumental. However, the type of value experienced by the architect in the example made my Korsgaard can also be viewed as the intrinsic conative value described by Rice, 1943, that has to do with the “intrinsic gratification” experienced within the process of attaining a goal of some sort. As it may appear, the discussion of intrinsic and extrinsic value is quite extensive. However it is beyond the scope of this thesis to treat the topic any further.

**The aspect of time**

Thomson et al. (2003), argues that value is time-dependent. Also Perry’s definition of value as the fulfilment of interest implies that value can change over time. The time aspect of value seems closely connected to the subjective view of value, which is also the view held by Perry. Acknowledging the existence of extrinsic value understood as value that is context dependent, also necessitates dependency of time. Another interesting point made by Perry is the fact that an individual can take joy in the expectation of some achievement prior to its manifestation, even though it may not ever occur – that is according to Perry the **value of faith and fancy**. The aspect of time dependency is particularly important when trying to ‘establish’ customer value at the outset of a building project with a long life-span. Buildings have an impact on many different users and the surrounding society over many years. Accordingly, one may argue that buildings should be designed for flexibility/adaptability without too much emphasis on the first customer (e.g. Frank Gehry’s speech in Boland & Collopy, 2004:30; MacMillan, 2006).

**Measuring value**

Another important question is whether it is possible (objectively) to categorise value as less or greater value. As mentioned earlier this is indeed possible according to Moore (1922). However Moore points out that: *“The value of a whole must not be assumed to be the same as the sum of the values of its parts”* (Moore, 1903 §18). Perry points out that interest can be based on an assumption that may be true or false and value can therefore be tested e.g. “I may desire the medicine on the supposition that it will cure my cold” (Perry 1914:159). The assumption brings value to the medicine, however if the medicine does not provide a cure, it has no value. So if a value is based on a true judgment it can be said that it is more durable. Also Perry points out, that value can be perceived to be more significant when the interest in an object is collective, thus fulfilling the liking of the community – as were discussed in the chapter on intrinsic value. The dependency of collective interest is also pointed out by Rice, 1943, who describes how interests, not viewed in isolation, but in the context of life, conflicts with each other and the preference of interest does not only depend on the individual, but what the environment can supply and a group can accept. If however one views for example peo-
ple or animals to possess intrinsic value in the sense of them deserving respect at all times, it is not possible to perceive this kind of value as something that can be “added up” or maximized (Bradley 2006). Accordingly, the discussion connects to the distinction between intrinsic and extrinsic value. However, a more down to earth division is provided by Ove Arup (in Prins, 2009:6), who “distinguished between measurable value (commodity) and immeasurable value (extra-commodity, art and artistry aspects)”. Nonetheless, the value of a commodity is still likely to be very dependent on context (extrinsic value) and it is therefore not objective.

4.1.2 Values – a social psychology perspective

A natural extension to the subject of value is values, understood as ethical or moral guidelines (more elaborate definitions will be provided later). Accordingly, authors like Thomsen et al (2003), Wandahl (2005) and Mills et al (2009) have recently drawn attention to the subject as an essential part of the ‘value-agenda’. Thus, it is generally believed that values somewhat guide value judgements (e.g. Thomsen et al, 2003). In addition, some believe that values guide behaviour and it is therefore of interest to management studies (Wandahl, 2005; Mills et al 2009). As with value theory, delimitation is however needed, since the topic has been extensively researched within the field of social psychology. Thus, the current section only describes the theories of a few prominent social psychologists. The research conducted within the field of construction management will be described later.

Following the steps of J. J. Gibson, Hodges & Baron (1992) suggest a psychology of values or an axiological psychology. According to Hodges & Baron (1992) a distinction can be made between psychological explanations that provide ‘lawful’ and ‘rule-following’ accounts. Basically, the lawful accounts describe cognition and behaviour as a consequence of biological cause and effect processes, while the ‘rule-following’ proponents, explain cognition and behaviour via socially constructed procedures. The major difference between the two is that laws cannot be violated, but rules can. Some researchers do, however, suggest a blend of the two. However, Hodges & Baron (1992) argue that in the context of learning and development, social perception and action must be guided by something that is more flexible than lawful processes. In addition, Hodges & Baron (1992:266) argue that “Laws underdetermine actions (e.g. we may walk, skip, hop, or run to the office)”. On the other hand, if one adopts the rule-following perspective, ‘something’ also needs to consider whether rules should be complied with or not. Therefore, they propose values as the mediating link:
Our central thesis is that it is not laws, or the rule appended to them, or “wants or needs,” at least as conventionally understood, that ultimately guide the behaviour of organisms and the acts of agents, but values. (Hodges & Baron, 1992:266)

Hodges & Baron’s (1992) argumentation connects to the notion of ‘affordances’; the possibilities and resources offered by the environment to the perceiver. However, there are of course an infinite number of ‘affordances’ to utilise, which leads to some kind of intentionality in order to make a choice. The choice is again constrained by physical laws and social rules, however, as noted above at least rules are not final, which again leads to values as a mechanism for selection and coordination. They provide the following illustrative example:

An automobile stopped by a child standing in the road illustrates a value-realizing relation. Such a relation is not arbitrary in the way in which stopping for the red light is [a rule], but is not inviolable in the same way being stopped by the brick wall would be [a physical law]. (Hodges & Baron, 1992:271)

Again values provide the ‘glue’ or “elasticity” (Hodges & Baron, 1992:270), between laws and rules, that makes society work as a self-organizing mechanism. This is in a sense the argument for values-based management; the possibility of self-organization in a complex world that cannot be sufficiently steered by rules. One may of course adopt a goal-oriented perspective (like Herbert Simon). According to this, action is steered by instrumental calculation of cause and effect. However, as Valsiner (in Hodges & Baron, 1992:278) state: there are difficulties associated with ‘goal-directed’ accounts: (1) the problem of multiple goals and possible conflicts among them, (2) the temporal ordering of goals, and (3) the fuzziness of goals. On the other hand, one may argue that the same applies to values. However, values are not to be understood as goals in themselves, values are: “the objective ends by which we judge the adequacy of our desires…rules and goals cannot be self-justifiable” (Baron & Hodges, 1992:280-281).

In addition, the notion ‘value-realizing’, used in the above quote, indicate another facet of Hodges & Baron’s theory: In a dynamic, evolutionary world, values are not given; they work both as constraints and enablers (of choice) but are also gradually realized through action. Goals are specifiable by nature, where values are ambiguous and “progressively revealed only in the activity of creation and discovery and are often unarticulated until after their emergence in the thought or action they assess…For example; what it means to be a good mother or father is always somewhat open; it is something one learns to be by doing” (Baron & Hodges, 1992:280). This may be an important reflection to make, when trying to fix values in for example a partnering agreement; it is
not completely clear what is meant by trustfulness, openness etc. (and the interpretation will differ for each person).

Hodges & Baron (1992) also exemplifies the ‘learning perspective’ with a child, who is not simply adhering to ‘culture’, but constantly challenges norms and rules. Accordingly, Hodges & Baron emphasize negotiations (not only between a child and her parents) as opportunities for learning about values\(^5\). Furthermore, Hodges & Baron (1992) note that there is no fixed hierarchy of values; if one value(s) is treated as the single most important value(s), and as such treated as a rule or goal, fanaticism is likely to arise (e.g. if freedom is treated as the most important value(s) and values like compassion, basic human rights etc. are set aside).

However, regarding structure of values, Schwartz provides the most comprehensive and empirically tested theory (Mills et al, 2009), which will briefly be described below.

**Ten universal values categories**

According to Schwartz, there are 10 basic and universal values, which are structured in the ‘modified quasi-circumplex structure’ shown in figure 4.1.2.1. The meaning of the values is provided in table 4.1.2.1. The distance between the values (in figure 4.1.2.1) symbolise a motivational continuum meaning that if the values are close to each other they are likely to have similar underlying motivation (they are congruent), whereas values that are opposite to each other represent conflicting motivations. Thus it is for example not a mistake that Hedonism lies closer to Stimulation than Achievement. Had the values been equally distributed on the periphery of the circle it would have been a ‘circulant’ model. Instead it is a quasi-circumplex model. The reason why it is also a modified quasi-circumplex model is because there is also a continuum from the middle of the circle and beyond the periphery. Thus, Tradition lies on the same polar angle as Conformity, and therefore shares the same underlying motivation: “subordinating self in favour of socially imposed expectations” (Schwartz & Boehnke, 2004:235). However, the closer a value(s) is on the centre, the closer it is considered to be on ‘the self’ and it is also viewed as less abstract than a value(s) that lies beyond the periphery. For this reason it becomes a modified quasi-circumplex model. The 10 values categories may furthermore be grouped into four overall categories as shown in the figure: Openness to change, Self-transcendence, Conservation and Self-enhancement. However, according to Schwartz & Boehnke (2004) these should only be seen as purely theoretical categories that have been suggested to simplify the model – other groups can be formed as long as they consist of congruent values categories (e.g. a group of Benevolence, Tradition and Conformity).

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\(^5\) Accordingly, in the observations made within the current research case-studies, the protocol was set up to emphasise discussions of design-alternatives, which sometimes took the form of negotiations.
As indicated above, the values are to be understood as ‘motivational’ values defined as: “desirable, trans-situational goals, varying in importance [to each person], that serve as guiding principles in people’s lives” (Davidov et al, 2008:423). “Trans-situational goals” means that they are to be understood as broad context independent goals (Bardi & Schwartz, 2003). They cover values items that have been assembled from other authors and are believed to rest on what is described as three “basic requirements of human condition” (Davidov et al, 2008:423):

1. Needs of individuals as a biological organism
2. Requisites of coordinated social interaction
3. Survival and welfare needs of a group

In order to test the theory 46 values items have been structured in a questionnaire (the Schwartz Value Survey: SVS) as sub-values within the 10 overall categories. Forty-
Definitions of the motivational types of values and items used as markers

- **Power**: Social status and prestige, control or dominance over people and resources (authority, social power, wealth, preserving my public image)
- **Achievement**: Personal success through demonstrating competence according to social standards (ambitious, successful, capable, influential)
- **Hedonism**: Pleasure or sensuous gratification for oneself (pleasure, enjoying life, self-indulgent)
- **Stimulation**: Excitement, novelty, and challenge in life (daring, a varied life, an exciting life)
- **Self-direction**: Independent thought and action—choosing, creating, exploring (creativity, freedom, independent, choosing own goals, curious)
- **Universalism**: Understanding, appreciation, tolerance, and protection for the welfare of all people and for nature (equality, social justice, wisdom, broadminded, protecting the environment, unity with nature, a world of beauty)
- **Benevolence**: Preservation and enhancement of the welfare of people with whom one is in frequent personal contact (helpful, honest, forgiving, loyal, responsible)
- **Tradition**: Respect, commitment, and acceptance of the customs and ideas that traditional culture or religion provide (devout, respect for tradition, humble, moderate)
- **Conformity**: Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms (self-discipline, politeness, honoring parents and elders, obedience)
- **Security**: Safety, harmony, and stability of society, of relationships, and of self (family security, national security, social order, clean, reciprocation of favors)

**Table 4.1.2.1: The meaning of Schwartz’s 10 universal values categories**

(Schwartz & Boehnke, 2004:239)

This is a somewhat different understanding of values than the ‘learning perspective’ suggested by Hodges & Baron (1992). In addition, Maio & Olson (in Maio et al, 2001) found that when people were asked to consider reasons for particular values, they were likely to change their values (the values were rated either more or less important than in the first rating). However, the effect of reflection was eliminated when this opportunity had been given in advance. Maio et al (2001) provide the explanation that most values are commonly held without individual reflection (cognitive support) – the values have been taught through childhood and any offhand rating is mostly based on ‘feelings’. Thus, when people are asked to provide supporting reasons for values they become

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⁶ For some reason ‘accepting one’s portion in life’ (Tradition) and ‘world of peace’ (Universalism) has been left out. It is also noteworthy, that the amount of value-items has varied in Schwartz’s work. Thus, according to Mills et al (2009) there was originally 56 items, which had been assembled from the work of other researchers. However, as described above Schwartz & Boehnke (2004) refer to 46 items, whereas it 57 items are included in Bardi & Schwartz (2003). It may, however, be a matter of statistical methodology as some of the value-items have proven to be more robust than others across cultures (c.f. Bardi & Schwartz, 2003:1210)
more conscious about values and reflect more thoroughly on whether they find them important or not (Maio et al, 2001). In addition, Bales (1999) argue that within (problem-solving) group interaction values are constantly being reevaluated in the context of other values:

The participants use certain of their values, by persuasion, rhetoric, or any number of psychological “mechanisms of defence” or modes of attack, to call into question and modify or change the meaning of other values, both in their own mind or the minds of others.[Bales, 1999:200]

Accordingly, the selective mobilisation and ‘test’ of values in group interaction may alter how individuals feel about the problem at hand (Bales, 1999). Whether this in fact is a matter of change in values, or values becoming (temporarily) subordinated to group pressure and persuasion, is an open question. Thus, Bales (1999) also recognize some retention in values; for example, individuals in a group who initially (seem to) have different values tend to become even more in opposition to each other when group interaction proceeds. On the other hand, initial values-similarity between individuals tends to be reinforced Bales (1999). The subject of contextual pressures connects to the discussion below about values and behaviour.

**Values and Behaviour**

It seems rational that values guide behaviour, which is also the reason for management scholars’ interest in the topic. For instance, this is the fundamental basis for Values-based Management (e.g. Wandahl, 2005). Nevertheless the evidence is unclear. Although some researchers have found supporting evidence, there are equally researchers who have found the opposite (Karremans, 2007; Mills et al, 2009). It is however a fact that frequently people do not act in alignment with their espoused values, but it is likely to be a consequence of situational conditions (Maio et al, 2001; Karremans, 2007). Accordingly, Bardi & Schwartz (2003) suggest that behaviour is directed by values but it may be ‘obscured’ by normative pressures (e.g. group pressure). A clear example of value-incongruent behaviour is provided by Latané and Darley (in Maio et al, 2001; Karremans, 2007), who found that people are less likely to help others, when more people are present. Thus, if more people are present the responsibility seems to be differentiated and each individual is less inclined to take action. Time-pressure is another situational factor that may influence behaviour (Maio et al, 2001). Accordingly, Maio et al (2001:106) state that: “values may function as paper tigers, appearing strong only when unchallenged by external factors”.

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Nonetheless, Bardi & Schwartz (2003) found that especially values of stimulation and tradition greatly relate to behaviour. However, the results in (Bardi & Schwartz, 2003) are based on questionnaires in which respondents were asked to either self-report behaviour or report the behaviour of a person they knew. These data were then linked to the result of another questionnaire-survey of the corresponding persons’ values. Thus, no direct observation of actual behaviour was performed and the results again rest on the presumption that respondents can and will rate their values without ‘bias’ (e.g. admit that they value power over universalism).

In an experimental setting, behaviour was, however, observed by Maio et al (2001), who found support for their hypothesis that if people contemplate on reasons for values, value-congruent behaviour is more likely (in relation to equality and helpfulness). The study also tested whether this was only a matter of becoming more conscious about certain values, however, this proved not to be the case; it was a matter of cognitive support through easy accessible reasons (Maio et al, 2001). Subsequently Karremans (2007) ‘merged’ this experiment with Schwartz’s structure of values, to see whether contemplation on values (honesty and loyalty) that according to Schwartz share the same type of motivation, would also influence (strengthen) behaviour expressing a related value(s) (helpfulness) (honesty, loyalty and helpfulness are all included in the values category benevolence – see Figure 4.1.2.1). The experiments showed good support for this hypothesis. In addition they explored whether contemplation on values (successfulness and ambition) that according to Schwartz may be in conflict with helpfulness, would decrease helpful behaviour (to help an experimenter, who had knocked over a cup of ten pencils, after having contemplated on the values). This could however not be proven. As Karremans (2007) himself point out; one may also question whether helping the experimenter picking up pencils was in fact conflicting with ‘successfulness’ and ‘ambition’. Importantly, both Karremans (2007) and Maio et al (2001) found a significant difference in value-congruent behaviour between groups that were only ‘primed’ with the values (e.g. solving anagrams where the word helpfulness and helping emerge) and groups who actively contemplated on reasons for values (that latter had greater effect). Thus active self-analysis is more effective ‘manipulation’ than just reminding people about values.

Even so, based on a literature review Mills et al (2009) concluded that the evidence, on the subject of linking values and behaviour, remains unclear. However, with the above description of values, it is now possible to make additional distinctions between related notions such as norms, attitudes etc.
4.1.3 Needs, attitude and other related notions

Values are believed to structure attitude (Maio et al, 2001; Mills et al, 2009). In addition, values are positive laden and abstract whereas attitude usually is related to an object and can be negative (Mills et al, 2009). Accordingly, Merriam-Webster online define attitude as “a mental position with regard to a fact or state” (accessed the 30th of July 2010). Wandahl (2005:58) describe attitude as an expression of a personal belief towards an object, person, event etc. A belief is here understood as a claim of expectation about reality (Wandahl, 2005:58). Accordingly, Merriam-Webster Online (2010) describes belief as both a conviction of truth of something, but also a “habit of mind in which trust or confidence is placed”. Norms are distinguished from values in their ‘ought to’ characteristic (Mills et al, 2009). In addition, norms embed specific actions (e.g. don’t steal), whereas values do not (Beyer, 2006). Regarding needs, Mills et al (2009) draws on Maslow and distinguish values from needs by the motivational aspect in values; needs are only motivational when they are not satisfied. One may add, that needs seem to be more fundamental as psychological or physiological requisites (cf. Merriam-Webster online), whereas values leans more towards ‘opinions’ about something. Moral is a matter of conformity in behaviour to established rules or values (Wandahl, 2005; Merriam-Webster online). According to the Merriam-Webster online, a purpose is “something set up as an object or end to be attained”. A goal is almost synonymous to purpose but seems more final and specified; many sub-goals can be formulated to serve the same purpose. A connection between moral, goals, needs and values is then; that in order to be morally justifiable, the attainment of some goal or purpose, which may derive from certain needs, should not conflict with relevant values. As described by Hodges & Baron (1992), goals cannot be self-justifiable. Below more space has been allocated to the specific relation between value and quality, as this distinction seems even more important than the above-mentioned.

Value and quality

Moore argues that a difference in quality necessitates a difference in intrinsic nature [value] however the converse is not true (Moore, 1922). He exemplifies this with a loud and a soft sound that may be of the same quality, but have different “intrinsic nature”. Rice (1943) states, that the term quality as applied to values has a multiplicity of meaning. However, that which is commonly meant by the term quality, of an object or an act, is “the ground for approving it” (Rice, 1943:338). Thus quality denotes the grounds of valuation. Then the challenge is to analyse the properties that constitutes the ‘ground’. In order to do this, Rice differentiates between quality that refers to instrumental-, intrinsic conative- or intrinsic perceptual value. When referring to instrumental value it is possible to “specify the end to which the object is useful and what properties constitute its utility.” For example a piece of cloth can be said to have a good quality meaning that
it is durable and keeps you warm – then it is possible to analyse what properties that makes it durable and keeps you warm (and thereby constitutes the grounds of valuation). As pointed out by Rice the quality of cloth can of course mean something else – e.g. it is fashionable. When quality refers to the intrinsic characters of conative value, it is, according to Rice, possible to describe “the factors” in the specific conation. This seems to call for further elaboration, but Rice does not provide one. When quality refers to the perceptual or aesthetic source of value it is possible (for an art or architectural expert) to analyse what contributes to the immediate experience (Rice, 1948). Somewhat similar, Thomson et al (2003), view quality as an objective assessment of the fulfilment of (prescribed) requirements, whereas qualities are physical or functional product attributes (Thomson et al, 2003). Accordingly, Thomson et al (2003) argue that current methods for measurement of product quality are mostly focused on compliance with quality standards – not the appropriateness of the product. This is a key difference when comparing to the notion of value.

Accordingly, fulfilment of qualities or product attributes is not considered equally valuable in any context. This may be explained via reference to the Kano model (in Kelly et al, 2007:197), which is named after the quality guru Dr. Noriaki Kano. Kano distinguished between three quality variables that determine satisfaction (the overall value judgement): these are (1) basic characteristics, (2) performance characteristics and (3) delighters. The basic characteristics are self-evident (the house provides shelter) and the customer will not even notice that they have been fulfilled. However, if they are absent the customer will be dissatisfied. Regarding performance characteristics, the customer will not consider these as obligatory in the same sense, but she will be more satisfied if the level is high (e.g. the level of security). The delighters are unforeseen extra product attributes that provide unexpected delight. However, as time goes by, performance characteristics tend to become basic characteristics (e.g. air-bags in cars) and previous delighters are no longer unexpected. Thus, the customer becomes more and more demanding as his frame of reference expands and although the same quality may be provided in the ‘next’, similar product, his value judgement is likely to be reduced (if nothing new has been added). The relationship between quality and value will be further clarified below in the context of construction management.

4.1.4 Value and values in construction management literature

In the above review of value and values theory some references have been made to construction management researchers. However, this section focuses specifically on literature within this field of research.
In construction, one of the first known attempts to define value was made by the Roman architect Marcus Vitruvius Pollio (died about 25 BC) who wrote that all architecture should possess strength, utility and beauty or firmness, commodity and delight (Vitruvius, book 1, chapter 3) depending on translation of the ten books of Vitruvius. This description of value in architecture is one of the most cited and influential in western culture ever since it was re-discovered in the fifteenth century (Winch, 2008, Boland & Collopy 2004). It is often overlooked, that Vitruvius also mentions the importance of considering “the nature of the place” or suitability to surroundings in his sixth book, chapter 2. This highlights the range of the value concept in construction. However recent attempts to try to define value are more of a mathematical sort. Accordingly, based on an analysis of value management texts, Kelly (2007:436) found that the most common definition is:

\[ \text{Value} = \frac{\text{Function}}{\text{Cost}} \]

This equation is also the foundation for traditional value engineering (as will be described later). However, given the more philosophical thoughts on value, this definition seems rather simplistic and, in the view of the author, it does not make sense to say that ‘value’ multiplied by cost consequently should equal ‘function’. Accordingly, Lawson (2006) argue that the concept of value in architectural design is highly ambiguous, hard to quantify and difficult to measure. However, value engineering proponents like Snodgrass & Kasi (1986) recognize that value cannot be stated as a formula, but they believe it can be “helpful”. More in line with the subjective view of value Thomson et al. (2003:339) argues that “value does not exist in its own right, but is an assessment of an object”. This is somewhat similar to Bales (1999:96) who, within the realm of social psychology, defines value as: “a mental process of “evaluating” that relates perceptions, images, fantasies, and concepts to each other”. However, Thomson et al (2003) suggests a working definition for construction where value is represented (again in a formula) by the relationship of positive and negative consequences:

\[ \text{Value} = \frac{\text{benefits (what you get)}}{\text{sacrifices (what you put in)}} \]

The ‘sacrifices’ are defined as both resource consumption and emotional efforts. However, in somewhat opposition to the subjective view, Jensen (2005) argues that a distinction can be made between ‘design value’ and customer value, where the former is relatively objective and equals the market exchange value, whereas the latter is more subjective. This seems to build on an underlying assumption that designers are only seeking profit. Like many others, Jensen (2005) also highlights the distinction between value and values. Thomson et al (2003) define the latter as: “the principles by which we live.
They are the core beliefs, morals and ideals of individuals and are reflected in their attitudes and behaviours in society”. The same authors in Mills et al (2009) furthermore state that “Values are learned by individuals through socialisation according to the specific moral and cultural paradigms within a social group”. Kelly et al (2007:148) argues that values constitute a psychological dimension that influences a person’s judgment of value. Also, Wandahl (2005) adopts the distinction as a way to differentiate between ‘product value’ and ‘process values’:

Value is always related to something physical existing. Values, on the other hand, are the beliefs of individuals, i.e. perceptions of good/bad and right/wrong….However, this creates a problem when mentioning value in plural.
In a building context this problem is solved by referring to value and values as product value and process values respectively (Wandahl, 2005:15).

According to Wandahl, market and utility value determines product value, whereas human values determine the process values. Process is here understood as the (project) process of producing the product. This latter distinction is somewhat similar to the distinction made in the workshop model described earlier (which is why the above quote is highlighted here). However, when considering Rice’s description of conative value and Korsgaard’s example of the architect who takes joy in his work, the author believes it makes more sense to perceive ‘process value’ as conative value. Accordingly, process value is to be understood as the gratification that is experienced by the practitioners or client in the process, not something that equals their core beliefs as indicated by Wandahl (2005). Instead it is proposed to use the terms ‘organisational values’ or ‘project values’ to denote the values and rules that project organizations often formulate to remind themselves of how to behave. Organizational values and individual values are also the terms used by Mills et al (2009) and the UK research programme VALiD. It may also be noted, that several examples have been provided where value is not related to something physical and, at the same time, has nothing to do with personal moral/ethical beliefs (e.g. the value of faith and fancy described by Perry; conative value described by Rice; the value of contemplation described by Aristotle).

In connection to this, a central part of the VALiD programme and the research reported by Mills et al (2009) is to make explicit the potentially conflicting values of the members who form a (project) organization by means of the Schwartz Value Survey (SVS). The research is instrumental in its nature and will be further described under the heading Values-based management. However, some of their results are of general theoretical interest: Although not surprisingly, Mills et al (2009) found that when comparing groups of architects, engineers, quantity surveyors, values managers and building maintenance/operations professionals; the architectural profession placed greater emphasis
on ‘Aesthetics’, ‘Protecting the environment’, ‘Spirituality in work’ and ‘Creativity’. It is also noteworthy that statistical ‘misalignment’ was found between architects and quantity surveyors on the matter of ‘Aesthetics’ and ‘Protecting the environment’. Also, misalignment was found between architects and operations people regarding ‘Clean’. Furthermore, misalignment was found between engineers and architects on ‘Creativity’. This seems to indicate stereotypical differences in values and role-frames. Nonetheless, Mills et al (2009) found that there were more similarities between organizations than differentiators.

**Variables in value-formulas and value-systems used in construction**

If one considers the contents that make up any formula (e.g. value = function/costs) or list (e.g. Vitruvius: strength, utility and beauty), which is often used in value engineering and value management one might ask: If value is a subjective judgement, what are these ‘variables’ then? They may be understood as values, but fundamentally the variables are used as both guidelines and ‘sets of grounds’ that are found relevant for the specific evaluation of value. This then, according to Rice, should be seen as qualities. But how does this relate to the notion of values? When considering valuation of a commodity, Thomson et al (2003) argue that value is ‘framed’ by values, which are related to quality in the sense that “the qualities sought by users are…a result of their values” (Thomson et al 2003:336). Thus, according to this, values (core beliefs and ideals) guide the choosing and priority of relevant qualities. In a specific situation, the values may also guide the assessment of whether the fulfilment of qualities (the quality) is appropriate and consequently the resultant value. This understanding connects somewhat to the tool of design quality indicators (DQI) described in Gann et al (2003), which also takes its outset in Vitruvius’s commodity, firmness and delight as a way to structure a discussion of design quality within a project team (with the ultimate aim of achieving higher value). However, the DQI uses the terms Function, Build Quality and Impact and thereby suggests that function and impact is something else than quality (qualities). On the other hand, Volker & Prins (2006) state that in an architectural context the term ‘value’ is known as ‘build quality’ (as it is also indicated in Beim & Jensen, 2005). Accordingly, after having analysed various ‘value-systems’ (lists of variables) Kelly (2007:438) state that: “These lists tend to jumble quality and values”. This may be the reason why Ballard (2008) uses the term ‘design criteria’, while Kelly (2007) himself suggests a list of ‘performance variables’.

The above distinction between values, value and design qualities (criteria, performance variables) makes particularly good sense when talking about commodities: If a person is to build a house, he may prioritize aesthetics (beauty) and low-energy consumption (protecting the environment). These are values according to Schwartz’s list of value
items. However, in this situation it will be more productive to view them as design qualities that reflect the person’s values. Thus, in relation to his garden shed, the same person may prioritize functionality, which is not really a ‘values’ according to the above definitions. This does not mean that the person’s values have changed. Thus the house and the shed have at least two different purposes: (1) to have a nice place to live and (2) to store garden utensils. The purposes may furthermore serve different needs e.g. comfort, sleep, pleasure. Accordingly, values (e.g. aesthetics and taking care of mother earth) are not the end-goal, but they are likely to be reflected in the purpose and (sub-)goals of a project. Thus, guided by the customer’s needs and values the specific purposes may crystallize into desired design qualities. The logic in value management is that if these qualities are met it is likely that the product has value to the customer. Likewise, instead of ‘purposes’ Thomson et al (2003) inject ‘objectives’ as an intermediate layer between values and qualities. Ballard (2008) suggests that purposes come ‘before’ values, which then feed into the development of design criteria. However, fulfilment of qualities is ‘only’ a matter of achieving quality. If value is to be achieved the ‘appropriate’ qualities, in the specific situation, needs to be met. Thus, if designers and contractors fulfil the initially stated qualities, but the context changes and the client’s needs change, he may not perceive the product to be of high value, although it has high quality.

The terminology becomes more difficult when considering social interaction (as opposed to a commodity). However in order to be consistent and avoid confusion of ‘values’ (core beliefs and ideals) and process value (understood as conative value experienced within a process or activity), it is, as described above, proposed to make a distinction between values and ‘organizational values’. Thus, when jointly declaring that all participants should honour their agreements, be honest etc. these are seen as rules or intentions for good behaviour in the organization. These organizational values have been chosen on the basis of commonly accepted values and norms for the particular setting. In a different situation, another set of organizational values may seem more appropriate. The same participants may for example play a game where part of it is to lie and tell false stories, consequently they are dishonest. This (again) does not mean that the participants have changed their values. They have just (by means of their values and different norms) prioritised other rules for behaviour in the specific situation. If people then experience the process as gratifying they obtain process value from it. On the other hand, workers may do their job effectively and honour the code of conduct (honesty, loyalty etc.), but find the work (e.g. digging trenches) extremely boring. They may only do it for the money or be somewhat forced to do it. In a Value(s)-based management sense, as propagated by Wandahl (2005), this situation would nonetheless be associated with a high score on ‘process values’ because of the compliance with organizational values. In the author’s view, this only makes sense from a narrow management perspec-
From the point of view of the workers, their work (in this imaginary situation) is not associated with process value, but it does contain instrumental value as a means to a salary. The following section summarizes the review of value and values.

### 4.1.5 Value characteristics and peculiarities – a summary

The author will not dare to make an attempt to propose a new definition of value. Instead the author will suggest, on the basis of the review on value theory, the following characteristics that should be taken into consideration when addressing the concept of value:

1. Value will in most cases be a subjective judgment depending on human interests, which are structured by needs, purposes, values and other situational factors (Perry, 1914; Korsgaard, 1986; Snodgrass & Kasi, 1986:257; Thomson et al, 2003)

2. The term “value” (a judgment) can be distinguished from the term “values”: the individuals core ideals or the ends by which we assess the appropriateness of our desires (Hodges & Baron, 1992; Thomson et al, 2003; Wandahl, 2005; Jensen, 2005; Kelly et al 2004:148; Mills et al, 2009).
   - i. Values somewhat guide behaviour, but can easily be overruled by situational conditions (Karremans, 2007; Bardi & Schwartz, 2003; Maio et al, 2001)
   - ii. Values are likely to ‘frame’ value judgments (Thomson et al, 2003; Mills et al, 2009)
   - iii. Values may change through experience and contemplation (Hodges & Baron, 1992; Bales, 1999; Maio et al, 2001; Karremans, 2003)

3. An item can in some cases be objectively measured as more or less valuable compared with another item (Moore, 1922:256; Thomson et al, 2003)

4. The objective valuation (often) depends on context/situational factors e.g. what the environment can supply, group consent, frame of reference etc. (Moore, 1922:256; Smith, 1948; Bales, 1999:200; Thomson et al, 2003, Kano in Kelly et al, 2007:198)

5. As a consequence of no. 1, 2-iii and 4 some (if not all) value(s) changes over time (Perry, 1914; Snodgrass & Kasi, 1986:261; Bales, 1999:200; Thomson et al, 2003)
6. However a valuation can be said to be more durable if many people agree on it and it is based on “right” assumptions/information (Perry, 1914; Bonke and Winch, 2002)

7. Value can be instrumental (Smith, 1948; SEP, 2007)

8. Value can be found not only in connection with a physical object (utility value & exchange value), but also in activity, love, goodness, friendship, knowledge etc. (Aristotle, 350 BCE, book 10 § 8; Bradley, 2006). Specifically (conative) value can be experienced within a process towards a goal (Perry, 1914; Rice, 1943). This may be termed process value.

9. Value is also distinct from quality which can be viewed as the level of objective fulfilment of prescribed requirements/qualities (Rice, 1943; Thomson et al, 2003, Kelly et al 2004). Value is determined by the appropriateness of the chosen qualities and their fulfilment.

However, in practice this subjective view may still need to be supplemented by a more objective view on value to account for false judgements (as pointed out by Korsgaard). Even though the author cannot find any convincing support in the literature for the existence of objective or intrinsic value, the durability of a value judgement may be so strong (in relation to item 4 and 6 above) and values may be so deeply rooted in culture, that a value judgement can almost be regarded as intrinsic or objective (like historical artefacts, nature etc). This connects to Bourdieus (1998:56) notion of Doxa: “an orthodoxy, a right, correct, dominant vision – something that is felt to be stronger than the self”. Finally this discussion of value and values may be a matter of ontology, which will be reflected on below.

**Understanding values as a matter of ontology – final reflections**

As mentioned above, the connection between values and behaviour is unclear (Mills et al, 2009; Karremans, 2007; Bardi & Schwartz, 2003). In view of that, this may be seen as an irresolvable discussion of ontology. According to Pfeffer (1982) there are three predominant perspectives within organizational theory; (1) “the rational choice” perspective where actors are knowledgeable and their actions are guided by internal preferences/values (which are predetermined the situation as in Schwartz’s framework); (2) “The External Constraint or Situational Control Perspective”, which – as the name implies – emphasizes the external influences on action. Within this perspective actors make sense of the situation “after the fact” and their actions are primarily determined by situational constraints (Pfeffer, 1982:8). Consequently, within this perspective the influence of internal, individual values is softened. The influence is, however, completely
dissolved in the third perspective named the “Almost Random, Emergent Process View of Action”. Within this perspective action is neither a (logic) response to internal values or external stimulus. It is seen as problematic to try to predict behaviour from external influences because of the ambiguity of actors’ interpretation of the influences. In addition, cognition and preferences are seen as emerging from action and therefore they cannot be the guiding forces either. Accordingly, Pfeffer (1982:9) states that researchers – within this ‘process view’ of action – have argued that “one of the purposes of behavior is to discover preferences thorough experiencing various outcomes”. This statement somewhat aligns with the theory suggested by Hodges and Baron (1992).

Consequently, traditional value management methods, which aim to make client value(s) explicit in the early project stage for subsequent evaluation and performance measurement of design solutions, may be categorized within the “rational choice” perspective. Accordingly, the debate on ontology has somewhat been raised by Green (1999) who criticises traditional value management methods as unfit for the briefing phase as they are based on a positivist epistemology that neglects the influence of actors’ differing interpretations. Therefore, Green (1994, 1999) suggests a social constructivist ‘soft-system’ learning perspective that emphasises consensus instead of optimization.

Finally, if one adopts a postmodern perspective on identity as something that shifts rather frequently as a response to different social settings, then ‘personal’ values are also likely to change rather frequently. This may pose a challenge to values-based management, which somewhat rests on the creation of stable shared values.

However, this discussion is too wide-ranging to be treated any further in this section. Nonetheless, it is important to be aware of these more fundamental perspectives that underpin management concepts and research results. Hence, underlying ontological and epistemological perspectives are not always made explicit by the authors themselves.
4.2 Theory of designing

Theory of designing is relevant to the thesis as background knowledge for observing and analysing the actions and talk of designers.

However, there are many ways of viewing the act of ‘designing’. Thus, Cooper & Press (1995) argues that design can be understood in at least six different ways: as a form of art, the work of a family of various professions, a creative act, problem solving, an industry, and a process. Lawson (2006:3) identify that the word ‘design’ can both refer to an end-product and a process, which may range from something we could call ‘engineering’ to something resembling ‘art’. Orlikowski (2004:91) draws attention to the Latin meaning of the term: “de- + signer- ‘to denote, signify, or show by a distinctive mark.’ To design, thus, is to make representations of the world”. These representations, if translated into action, produce material and social realities, which are continuously ‘enacted’ by its users in changing and unforeseeable ways (Orlikowski, 2004).

In order to provide an overview, Stumpf & McDonnell (2002) groups contemporary perspectives on designing into four categories: The Rational Problem-solving paradigm, designing as a Social Process, Hypothesis Testing and Experiential learning. Each paradigm is built on some basic assumption about the designer, the design task and the design process. These are shown in Table 4.2.1 below. The fourth category, experiential learning, has been greatly influenced by Donald Schön, who described design as a reflective conversation with the situation (Schön, 1991:268). This perspective has become popular (Cross, 2007) especially because it is instrumental in describing the difficult early stages of designing (Stumpf & McDonnell, 2002). For this reason, and because the paradigm is appropriate within the first meta-theoretical perspective, hermeneutics (Stumpf & McDonnell, 2002), emphasis will be placed on this fourth category in the following. It should also be noted, that although Schön’s original focus was the individual practitioner (which is not the focus of the present thesis) this perspective has subsequently been found useful within collaborative design activity (Valkenburg & Dorst, 1998; Stumpf & McDonnell, 2002). Design conversations in teams do not only function as a media for exchange of information and opinions – design is actively created (Luck & McDonnell, 2006). However, acknowledging the influence of groups on design development, the social process view of designing will briefly be outlined. In addition, when analysing the case-studies, the social process view was found to be very relevant – the perspective was well suited within the orientation of critical theory (as indicated in Table 4.2.1). Thus in line the explorative-integration case-study approach, the perspective was added to this chapter subsequently.
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<tr>
<td>Model of design task</td>
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<tr>
<td>Model of macro-level design process dynamics</td>
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<td>Converge onto single conjecture which withstands disproving data</td>
<td>Converge towards ‘fitness’</td>
<td></td>
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<tr>
<td>Model of micro-level design process dynamics</td>
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<tr>
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Table 4.2.1: Overview of current design paradigms and their underlying assumptions (Stumpf & McDonnell, 2002)

4.2.1 Design as a reflective conversation with the situation

According to Schön, the practitioner has an intuition or a “feel for the game”, which he calls “knowing-in-practice”. The practitioner attains this intuition through experience of
solving many variations of the same kind of problems, where a repertoire of expectations and techniques are developed (Schön, 1991:60). The practitioner learns to look for certain things, apply techniques and foresee the outcome of his action. Over time the knowing-in-practice becomes more tacit and spontaneous and as long as the situation is relatively stable (the same kinds of problems emerge) he becomes less subject to surprise. However, when confronted with a surprising or dissatisfactory result of his actions, reflection may be triggered. Reflection-in-practice takes the form of a ‘conversation with the situation’ (Schön, 1991:268) in which the professional performs an inquiry or test, as when the architect tries out a new sketch on the pad; In this case, the situation ‘talks back’ to the professional, providing confirmation and/or new understanding of the situation. This may lead to a reformulation of the initial problem diagnosis and initiate a new inquiry or test in an ongoing problem solving process. In this process, action and thinking is complementary and more generally speaking, without referring to any “practice”, it may be called reflection-in-action. Thus problem and solution are co-developed and can be regarded as inseparable (Lawson, 2006). The production of a satisfactory result can eventually bring the reflection to a close. According to Schön (1991:270) the direction and ending of reflection-in-action depends on at least four constants:

1. the media, languages, and repertories that practitioners use to describe reality and conduct experiments
2. the appreciative systems they bring to problem setting, to the evaluation of inquiry, and the reflective conversation
3. the overarching theories by which they make sense of phenomena
4. the role frames within which they set their tasks and through which they bound their institutional settings

These are not to be understood as unchangeable, but as Schön describes it “They do change, sometimes in response to reflection, but at a slower rate than theories of particular phenomena or frames for particular problematic situations” (Schön, 1991:270).

With regard to item 1, Schön mentions the sketch pad and physical scale models as examples of media to conduct experiments, thus creating a virtual world, where “rehearsals of action” can be performed. Item 2 may in this context be understood as the designer’s values, which bring consistency to the evaluation of the conversation. As Schön points out, the appreciative system (or values) may be heavily influenced by the professional community of which the practitioner is part of. Thus architectural trends may influence designer’s appreciative system. Regarding item 3, it is somewhat unclear (to the author) what Schön exactly means, but an interpretation could be that it is the overall ‘world-view’ of the practitioner, in the same way as the analytical framework ap-

7 Here is an analogy to Kolb’s learning cycle as it is also noted in Stumpf & McDonnell, 2002
plied in this study encompass three different world-views with distinct languages and ways of interpreting phenomena. Accordingly, Schön (1991:273) exemplifies this with a psychiatrist’s use of psychoanalytic theory. Item 4 has to do with the way the practitioner ‘frames’ (this term will be described in more detail below) her role in an institutional setting – thus in extreme cases the designer may see herself as either an artist or a service-provider to the client, who ‘just’ solves problems.

Below the process will be described in more detail as if it was structured in a sequence of framing, naming, moving and reflecting. However, it should be emphasized that this perspective highlights the iterative nature of design – it is not a linear process. In addition, some authors describe framing as a subsequent activity to naming (e.g. Valkenburg & Dorst, 1998).

**Framing**

The term ‘framing’ is an important part of the vocabulary of this paradigm. However, framing is only vaguely defined in Schön’s writing (Stumpf & McDonnell, 2002; Lawson, 2006). In his protocol of architectural designing, Schön (1991) identified a reframing when a designer got stuck in her attempt to fit some buildings to a sloped site (the first framing of the problem), instead the teacher suggested to align the buildings to a fictive grid that organized them in a preferred way in relation to the sun (a reframing). This meant that the buildings had to be carved into the sloped site, where they created ‘terraces’ that provided new opportunities in design development. Resorting to other researchers, Lawson (2006:292) describes a frame as both: “selectively viewing the design situation in a particular way for a period or phase of activity” and a “window on the problem” (Lawson, 2006:293). When looking at design as a collaborative activity, Stumpf & McDonnell (2002:13) states that “frames form the context of what is considered”. This includes a determination of what is considered as appropriate data, solutions and values (Stumpf & McDonnell, 2002:12). In a more narrow and tangible sense, Valkenburg & Dorst (1998) states that a frame is observed when the team “frames a (sub)problem or (partial) solution to explore further on”. Valkenburg & Dorst’s (1998) provide an example, where a group of designers distinguish between different functions of a robot (driving, shooting a ball, collecting a ball) and creates a frame when deciding to only address the function “shooting a ball”. This may seem as a simple matter of prioritizing what task to do first, but it turned out that the phrasing “shooting a ball” implicitly involved a discipline that was hard to follow. Thus, when the designers subsequently changed the function “shooting the balls” to “getting the balls into the basket” a reframing occurred which spurred design development – the implicit discipline associated with “shooting” had been dissolved. Thus (re)framing is likely to occur when designers face incongruence and it involves the imposition of a discipline, which sets
What influences framing

According to Schön (1991) a frame is likely to be structured by the practitioner’s experience of similar problems and repertoire of solutions (precedents). Schön (1991) uses the notion ‘seeing-as’ to describe when a practitioner solves an unfamiliar problem by seeing it as similar to a familiar problem (and its associated solution). The seeing-as (a pump, a wave etc.) can thus become a ‘generative metaphor’ in setting and solving the unfamiliar problem. The way a problem is framed, also hinges on the way a practitioner frames her role (Schön, 1991:210) e.g. an architect can see herself as: a mediator and integrator of various interests or an artist etc. In addition Lawson (2006) argues that framing can be influenced by the designer’s ‘guiding principles’ which seems as an overriding concept similar to what Schön describes as overarching theories. As examples of this, Lawson (2006) points at notions such as ‘sustainability’ or ‘minimal structures’, which a designer may apply as generative metaphors across a whole line of projects (Lawson, 2006:163). However, Lawson also notes, that design-ideas are often generated pragmatically as integrated responses to particular sets of aspects of the problems they encounter (Lawson, 2006:189) – not by any overriding design principles carried over from one project to the other. In this situation Lawson (2006) borrows the term ‘primary generator’ from Jane Darke (1979), to describe how certain aspects of the problem (the primary generators) may stimulate a design idea that becomes generative in developing the design. Lawson (2006:275) states, that the primary generator is similar to Schön’s notion of a frame, although the primary generator is more solution focused; “as a window on the solution space” (Lawson, 2006:295). Accordingly, the term is used by (Stumpf & McDonnell, 2002) within the hypothesis-testing paradigm in Table 4.2.1. Schön (1991), however, also describes the framing as a hypothesis experiment, where the designer in his subsequent moves tries to fit the situation to the hypothesis, while being open to its potential failure. Nevertheless, the concept of the primary generator implies a more essential and fixed ‘driver’ to the design process than the provisional disciplines (frame) created within the experiential learning paradigm. As Schön (1984:182) points out, “the work of framing is seldom done in one burst at the beginning of a design process. Designing triggers awareness of new criteria for design: problem solving triggers problem setting”. On the other hand Schön (1991:131) speaks of “local experiments nested within larger ones”, which implies that some disciplines

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8 The distinction between problem and solution space is however questionable. Thus, Lawson (2006) himself points out that problem and solution are inseparable in design practice.
have a more overriding nature than others. Presumably, the local experiment connect to the specific ‘move’ of trying to organize design elements, whereas the larger experiment refers to the concept of framing, but also the ‘systems of implications’ of earlier moves (which again relates back to the framing).

Framing in a group

Nevertheless, when a group of designers are to work together, they are likely to frame the situation in different ways and conflict may arise. Through the display of differences and reflection, a new frame may then be suggested and adopted as a common frame – if all or a majority of the participants can accept it (Stumpf & McDonnell, 2002). Here negotiation and persuasion – which is not necessarily bad – is likely to take place (Stumpf & McDonnell, 2002). It should be noted that the individuals’ acceptance of a common frame may be based on different interpretations of the meaning of the frame (Stumpf & McDonnell, 2002). Accordingly, Dorst & Cross (2001) describe how (individual) designers constantly ‘manipulate’ a given design assignment based on personal goals, the design situation and the resources available (e.g. time). Lastly it should be highlighted that the notion of reflection-in-practice and frame-negotiation would be irrelevant if the design problem was well-defined and ‘standardized’; then it could be solved by ‘knowing-in-practice’. However, the focus in this thesis is on non-standardized construction projects. Before continuing the description of the experiential learning paradigm, it is however relevant to briefly consider the ‘nature’ of design problems.

The design problem

To help designers navigate, when projects are not completely standardized, Lawson has developed the model of design constraints (figure 4.2.1.1). The model does not entirely fit into the terminology of experiential learning, but is helpful in illustrating the various aspects of design problems: The model distinguishes between whether a design constraint is internal, self-imposed from within the project – such as user-functionality – or motivated by external conditions, such as site and building-code. The model then links this dichotomy of constraints to its originators (designer, client, user or legislator) as well as the four categories of radical, practical, formal and symbolic constraints. The radical constraints encompass the fundamental functions of the building artefact. The practical constraints have to do with the ‘engineering’ parts of the problem, such as structural issues, water resistance etc. The formal constraints are those which bring about a certain amount of order or structure with regard to proportions, colours and materials, and the symbolic constraints have to do with the symbolic expression of the design.
The point here is not to elaborate and discuss this model, but – as Lawson does – highlight the complexity and range of issues which may be imbedded in design problems and the rationale in (subjectively) choosing a specific part of the problem, which can be coped with, and develop the design in an iterative manner. Since many aspects of the problem are interdependent and can be solved in an infinite number of ways, some design and construction researchers refer to the notion of ‘wicked problems’ (e.g. Smith et al, 1998; Winch, 2008), which is a term adopted from Rittel & Webber (1973).

![Figure 4.2.1.1: Model of design constraints (Lawson, 2006)](image)

### Solution-oriented or problem-oriented

In connection to this, Lawson (2006) found that designers tend to be solution oriented, which means that they quickly generate multiple solutions (or iterate on a solution) instead of spending a lot of time gathering information and analysing the problem before providing a single solution (which would be more of an engineering problem-solving strategy). Considering what has been described above, this seems somewhat logical, since the problem is often multifaceted and new meanings are likely to arise during design development. However, Kruger & Cross (2006) found in a study of 9 experienced (industrial) designers, that 3 designers could be characterized as solution-driven, 3 were problem-driven and the last three were either knowledge-driven (relied very much on personal knowledge/precedents) or information driven (gathered a lot of information). Thus, the notions of “designers” or “architects” should not be seen as a well-defined labels – the profession(s) covers diverse people who adopt different designing strategies (Beim & Jensen, 2005). Nonetheless, Kruger & Cross (2006) found that solution-driven strategies led to more creative solutions, whereas the problem-driven strategies led to slightly better overall quality when taking all evaluation-criteria into account (Kruger &
Cross, 2006). It is also noteworthy that the study confirmed the iterative nature of designing. However, no matter what strategy adopted, the activity ‘Generate partial solutions’ was the most frequent design activity, which somewhat confirms a tendency towards generating solutions (Kruger & Cross, 2006). To generate solutions is linked to Schön’s notion of *moving* which will be described below.

**Naming and moving**

In addition to framing, the designer identifies or ‘names’ design elements (a sloped site, classroom etc.) which – as described by Lawson (2006) – becomes the ‘characters’ of the design conversation. Accordingly, in their coding scheme for observing reflective practice in a group, Valkenburg & Dorst (1998:255) states that “*when a team is explicitly pointing to parts of the design task as being important, we code the activity as ‘naming’*”. Within the above understanding of framing, it seems likely that the choosing of ‘relevant’ design elements (sloped site, direction of the sun etc.) is affected by and in turn affects the framing of the situation (it is unclear what comes first – it may happen almost simultaneously or iteratively). According to Schön, the design elements are drawn from the designer’s repertoire of ‘normative design domains’. Thus, Schön proposes twelve design domains, which have headings such as: Building elements, Organization of Space, Form, Cost etc. The important thing here is not the specific contents of these domains (which are also somewhat unclear and will differ with each designer), but Schön’s description of the process in which they are used: The elements/domains are associated with norms (e.g. in organization of space) which the designer(s) will try to obey and integrate to the extent it is possible – this can be generative in developing the design (here ‘norms’ seem similar to the ‘constraints’ in Lawson’s model above). Thus the naming of design elements and the experimental moves of relating them to each other, have implications which, in addition to the framing of the situation, constitute disciplines for subsequent moves. Here ‘moves’ should be understood as local attempts/actions to shape the situation in accordance with the overall frame, which at the same time functions as probes in exploring the feasibility of the frame and the design problem in general (Schön, 1991:269).

The objective of designing then becomes the creation of (an acceptable level of) coherence between norms/disciplines and – as will be described in more detail below – the designers overarching theories and values. Accordingly, the conversation can be described as an unfolding narrative, much like telling a story, which – if successful – gives consistency to the design (Lawson, 2006). It should be noted that each designer may give different priority to design domains at different stages of the overall design process (Schön, 1991). Also, the story can to some extent be planned in advance based on experience. However, all consequences/implications cannot be foreseen – the situation...
talks back – and new meanings arise and the story develops (if the designer is open to ‘back talk’). Accordingly, it is argued in Boland & Collopy (2004) that a key to good design is keeping the design ‘liquid’ and not come to premature closure – to keep experimenting and discover new preferences (this is specifically interesting in relation to the matter of value creation). Likewise Lawson (2006) describes how designers often work with parallel lines of thought (different narratives). However, Lawson description of the phenomenon seems to lean against a ‘Hypothesis Testing’ paradigm of designing.

Reflecting

Nevertheless, at some point in the process of experimentation decisions have to be made for the design to move forward. The sequence of moves becomes too complex, if none are accepted as final. Thus, progressively a tentative adoption of a discipline may be either abandoned (which leads to a new move/experiment or a reframing of the problem) or evolve to a commitment to simplify the ‘design experiment’. According to Schön (1991:133) the framing of a problem is likely to be evaluated by (implicitly) reflecting on questions such as:

- Can I solve the problem I have set?
- Do I like what I get when I solve this problem?
- Have I made the situation coherent?
- Have I made it congruent with my fundamental values and theories?
- Have I kept inquiry moving?

It seems that the above mentioned constants come into play at this point. Within this context it is noteworthy that Schön (1991:135) specifically writes: “The evaluation of the frame experiment is grounded in the practitioner’s appreciative system”.

The specific move (the local experiment) is evaluated/reflected on in a threefold way: First of all, evaluation is based on the norms associated with the design domains (can coherence be created between the elements in the local move?). Secondly, a move is evaluated in terms of the implications of earlier moves (the global experiment including the framing). Thirdly, because each move produces unforeseen consequences, it is also evaluated in terms of any new problems and meanings that may arise (can the inquiry continue and do I ‘like’ the consequences?). The first two perspectives of evaluation imply that the designer must be able to shift stance between engaging in the part and the whole: “the designer must oscillate between the unit and the total” (Schön, 1991:102). Here the link to the hermeneutic circle of inquiry is evident.
2nd order reflection

However, Schön (1991) argues that reflection can reach a ‘higher level’, when the practitioner not only (intuitively) evaluates his action within the boundaries of his overarching theories, values and role-frame, but stops to reflect on these as well. It is a matter of becoming aware of the applied ‘system of understanding’. Schön calls this second-order reflection. The notion is furthermore linked to what Schön (1991) and Argyris (1977) call Model I and Model II theory of action, which forms the basis for respectively ‘single-loop’ and ‘double-loop’ learning. For the sake of delimitation, these concepts will not be dealt with in more detail, except it seems appropriate to mention, in the context of one of the case-studies presented below (and values-based management), that single-loop learning may help practitioners overcome problems in pursuing their (own) goals by reflecting on the means to archive their goals, whereas double-loop learning may take place when (publicly/jointly) reflecting on the underlying assumptions and desirability of these goals (Argyris, 1977; Schön, 1991).

4.2.2 Some overall considerations

Schön has been criticized for lack of clarity in his design vocabulary (Stumpf & McDonnell, 2002). Accordingly, the above description of framing, naming, moving and reflecting can seem a bit unclear especially together with similar terms drawn from other sources (design constraints, guiding principles, and primary generators) – which may not entirely fit into the experiential learning paradigm. However, the reason for including the latter is that the author also sees a fundamental correspondence between the concepts: The essence seems to be that (in complex building projects) the designer cannot look at the whole of the design problem, but only frame a part of it, thus leaving other issues aside, and make the problem even more manageable by imposing a generative discipline through the naming of design elements or a design idea/hypothesis. This forms the temporary boundaries and building blocks in an experimental, reflective ‘conversation’ between part and whole, where the boundaries and elements of designing can be changed or given new meaning until integration of disciplines have been achieved in a meaningful, likeable solution (or narrative). The complexity of the design process may seem insurmountable if it was not for the experience of the designer (feel for the game). Accordingly, Lawson (2006) ends up describing design as a set of skills grouped under the headings of: formulating (the situation/problem), representing, moving (creating solution ideas), evaluating and reflecting. In relation to management, there is also deliberation associated with the ‘experiential perspective’; within this view the outcome cannot be foreseen and the process cannot be meticulously planned.
4.2.3 Value and values within the experiential learning paradigm

Two assumptions seem to be made about values and value within the experiential learning paradigm. First of all Schön adopts the idea of an appreciative system which is relatively constant (although changeable) and may be structured by the practitioner’s professional community or other discourses – these associated values precede the situation. Secondly, preferences can be discovered within the developing conversation with the situation. This connects to the earlier distinction between values (core beliefs, moral and ideals) and value (judgments), where the latter is much more contextual and therefore fleeting. Thus although both values and value (judgments) are likely to change over time, a major difference, within this view, lies in the pace of change. It should also be noted that the designers framing, priority of design elements and reflecting are (more or less consciously) influenced by his appreciative system. Therefore the designer’s values are likely to be entangled into the design solution. Lastly, Schön describes how the ending of the conversation occurs when the designer is ‘satisfied’ with the result – not when all possible ways of framing the problem have been tested for their implications and equivalent solutions. Thus reflective practice is not about optimization, but creating a coherent whole that conform to the designer’s appreciative system and overarching theories.

4.2.4 The significance of words and the social process view

As mentioned above, the norms associated with design elements and the frames of the designers are sometimes experienced to be in conflict. Therefore a supplementary view of the design conversation becomes one of negotiating (Lawson, 2006). However, the experiential learning paradigm is based on a social constructivist perspective, and it should therefore be emphasized that the problem setting (the framing of the situation), the naming of relevant design elements and consequently the imposition of (conflicting) disciplines are not pre-established, but something that is more or less constructed by the designer(s) in order to act. Thus conflicts are not ‘objective’ – they may be dissolved by a mere change in words.

These considerations connects to Weick’s notion of ‘sensemaking’, where people – who often find themselves ‘thrown’ into an unpredictable world – make sense of their raw experiences and actions by talking (labeling) phenomenon into existence in a way that creates meaning and order (Weick et al, 2005). This labeling then works as a plausible basis for action (Weick et al, 2005). Thus, Lawson (2006:270) wrote: “Words have enormous significance since they represent a complex set of characteristics some of which may help the designer to see a way of proceeding”. As mentioned above; a re-framing of a situation can make problems go away or, as Tversky & Kahneman (1986) show, lead to a radical change in preference: Thus, within the context of decision mak-
ing theory, Tversky & Kahneman (1986) carefully demonstrate how different ways of representing (framing) the same decision problems (decision alternatives) will lead to different preferences of choice. Likewise, Green (1996b) highlight that decision-making is highly dependent on the specific situation and frame of reference. Accordingly, as described above, representations are not only means to act, but constitutive of reality (Orlikowski, 2004).

Likewise, Stumpf & McDonnell (2002) describe how designers rhetorically construct links (associations) between the accepted premises in a common frame and a (preferred) solution. They also found that persuasive schemes are utilized to successfully establish a re-framing (Stumpf & McDonnell, 2002). Persuasive schemes in designing were also found by Cross & Cross (1995), who highlighted that it is not uncommon for designers to get emotionally attached to a specific solution. It should be noted that persuasion in this context can be generative and positive.

This insight connects to the ‘Social Process’ paradigm of designing, which according to Table 4.2.1 sees designing as an argumentative process. This paradigm adds another level of complexity to designing. To provide an overview, Cross & Cross (1995) highlight the following ‘aspects’:

1. Problem analyzing and understanding
2. Information gathering and sharing
3. Roles and relationships
4. Conflict avoiding and resolving
5. Concept generating and adopting
6. Planning and acting

Thus, although it has already been emphasized that design problems usually are ill-defined, seeing design as a social process highlight the challenge of aligning different understandings of the (ill-defined) problem. This connects to potential difficulties in information sharing and communication among group members. In addition, the role of the designer may not only be structured by his profession and community, but also the very local, temporary group, which he is part of. The influence of each participant’s ideas and suggestions on the final design depends on the level of authority they are ‘granted’ by other group members (as illustrated in Cross & Cross, 1995). Furthermore, conflict is likely to arise as different perspectives on the problem and associated solution ideas are confronted. Cross & Cross (1995) show that one way to cope with this is to leave the conflict unresolved and move on to the next topic. However, different opposing concepts may stimulate creativity and synergy among designers and consequently, the generation, adoption and development of design concepts is somewhat dif-
ferent in a group than when performed by a solitary designer. Finally, Cross & Cross (1995:148) highlight that especially in the initial stages (solitary) designers often work in an “unplanned, intuitive and ad hoc” manner, which is considered beneficial to creative development (at least by some scholars). However, this is likely to be amplified when multiple designers are put together in a group. Accordingly, Cross & Cross (1995) found that although a group of designers (in an experimental setting) met the overall deadline of the design-task, they drifted from the agreed agenda several times during design development (this aligns with the iterative conversation perspective). The focus on the social process in designing connects to the subject of communication and group dynamics theory, which will be presented in the following chapter.

4.2.5 Summary

Two predominant design paradigms have been outlined. The experiential learning paradigm sees designing as a conversation with the situation. The designer names relevant design elements as ‘characters of the conversation’ with associated disciplines, frames a tentative problem-understanding (or concept) and tests its feasibility through experimental design moves, which are evaluated (reflected on) in relation to the overall frame, the disciplines and the designer’s appreciative system and overarching theories. The moves may lead to unexpected results (the situation talks back) and provide a new understanding, reframing and, thus, redirection of the conversation until a satisfactory result has been achieved. This includes subjective value judgement that is somewhat influenced by the designer’s role-frame, personal goals and professional community (values). The essential notion of framing may be understood as a hypothesis experiment or a window on the problem that sets boundaries for attention as a way to deal with complexity. Framing is likely to be structured by the designers overarching theories and experience – the designer’s repertoires of similar problems – which makes her capable of solving a problem by ‘seeing-as’. Particularly, the framing may take form of a generative metaphor. In consequence, when making unique products or buildings the design process is iterative and potentially endless, design problems cannot be comprehensively stated – problem and solution are inseparable – and there are no optimal solutions. Therefore the experience of the designer and his ability to ‘seeing-as’ are essential. In addition to this, the social process view of designing highlights the aspects of social interaction, which adds to the complexity of collaborative designing. This includes alignment of problem-understanding, the significance of language and communication, potentially opposing ideas and preferences, and resulting attempts of persuasion and conflict management. Finally it should be noted that the experiential learning view implies two assumptions about value and values; value judgements are in a constant flux – preferences are not pre-determined the situation – whereas values change at a slower pace and can be perceived as almost constant.
4.3 Communication and group dynamics theory

A fundamental aspect of value management is the conveying of information regarding perceptions of (client) value. In addition, construction projects are undertaken by various specialists trying to interpret project objectives and ‘integrate’ their knowledge into a building artefact. For these reasons, communication theory seems vital in the context of this research. Accordingly, in a survey on variables affecting briefing (architectural programming), effective communication was found to a critical success factor (Yu et al, 2007).

There is a vast amount of literature on communication research, with countless definitions and various perspectives often ranging from considering intra- or interpersonal communication to ICT and mass-communication (Emmitt & Gorse, 2007). However, looking specifically at the construction industry, Emmitt & Gorse (2007:3) have found it useful to define communication as ‘the sharing of meaning to reach a mutual understanding and to gain a response’. This emphasizes that communication is different from simply transferring information – there needs to be some kind of interaction between parties and a context must be established for the interaction to become meaningful (Emmitt & Gorse, 2007). Thus, close friends or specialists within the same profession communicate effectively because a special language or context has been developed (a system of meaning). However, given the organisation of construction projects with multiple specialist and stakeholders, who often meet for the first time, communicating is much more challenging. Knowledge about other participants’ knowledge must first be established and relationships must be built before effective communication can take place (Emmitt & Gorse, 2007). In line with this, Pietroforte (1997) draw attention to the level of codification of information. Thus the more codified a message is, the more precise and (consequently) effectively it can be communicated. However, this is only to the extent that the receiver is knowledgeable enough to decode the message. Accordingly, Pietroforte (1997) conclude that low-codified messages such as drawings are a preferred way of communicating in construction, because it can be distributed to a wide range of expertises, but this entails a lot of additional interaction because of the ambiguity associated with low-codified documents. So, in order to address ambiguity and organizational boundaries, integration is often pursued through meetings between multiple actors in the project team – as it is the case with value management workshops. Accordingly, research suggests that face-to-face meetings are still the preferred communication form to resolve problems and conflict (Emmitt & Gorse, 2007:22). Therefore, the theory presented in the following has been limited to primarily focus on interpersonal communication within groups and group dynamics theory. The reason for this is also the nature of the data obtained within the current research, which to a great extent is retrieved from observation of meetings. First, however, special attention will be directed towards understanding the term ‘client’ and communication-issues in relation to this phenomenon,
since it is the communication of the client’s value perception that is the focal point in value management.

4.3.1 Communicating with the construction client

Types of clients
As mentioned earlier, the term “client” usually covers a wide range of stakeholders with different and often conflicting values and needs (Green, 1996; Bertelsen & Emmitt, 2005; Macmillian, 2006). Differentiation is often made between experienced, inexperienced, public and private, short term (developers) and long-term clients (owners) which all represent different perspectives on the construction process. In addition the client will often comprise end-users, the surrounding society, legislators, funders and the project champion, who leads the project for the client organisation and who may be supported by a business case team and client advisers. Accordingly, Macmillian (2006) provide a categorization of stakeholders listed in Table 4.3.1.1 and the outcomes they are expected to value. In the following the term client will refer to the ‘initiator’ of a project, which typically is the owner (at least until the facility is sold) and which may include the end-users. Stakeholders may be understood as all parties (including the client and project organisation) who are effected by the project.

<table>
<thead>
<tr>
<th>Category</th>
<th>Stakeholders</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
<td>financiers, banks, PFI consortia, developers, government</td>
<td>return on capital, profitability, long-term value, ease of letting or selling, awards</td>
</tr>
<tr>
<td>Design and construction</td>
<td>Architects, engineers, surveyors, designers, contractors, subcontractors and suppliers</td>
<td>profitability, repeat business, awards, prestige</td>
</tr>
<tr>
<td>Occupant organization</td>
<td>chief executive, project directors, communications and marketing managers, general workforce, human resources managers, facilities managers, security staff, cleaners</td>
<td>organizational productivity and profitability, organizational vision, image and identity, corporate brand and reputation, corporate social responsibility, good working environment -- staff health and well-being, recruitment and retention, absenteeism, energy and maintenance costs</td>
</tr>
<tr>
<td>Public realm</td>
<td>local authority, local community, regional and national community</td>
<td>regeneration and inward investment, impact on property values, pollution, local health, employment, civic pride, neighbourly behaviour, vandalism</td>
</tr>
<tr>
<td>Visitors to building</td>
<td>hospital patients, hotel guests, retail customers, students, pupils, the general public</td>
<td>hospital recovery rates, retail footfall, educational attainment levels</td>
</tr>
</tbody>
</table>

Table 4.3.1.1: Stakeholders and the outcomes they value (Macmillian, 2006:265)

All client representatives, as well as actors in the project organisation, have different roles and responsibilities and complexity is increased by the fact that the involvement of individuals change during the project (Blyth & Worthington, 2001). Accordingly, Green (1996) argue that ‘client type’ categorizations, as the one shown in Table 4.3.1.1, are misleading because each ‘type’ consist of many individuals with different pasts and
world-views. In addition, the various parties have different levels of competences with regard to the aforementioned de-codification of information. All this seems to pose a variety of challenges with regard to communication.

**Communication challenges**

To further complicate the matter, change is embedded in construction projects, which is due to the nature of the design process (re Chapter on design theory) and changes in the environment (technology, resource availability etc). This creates various gaps between the expectations (aspirations, plans etc) and reality and it is the client’s perception of these gaps that forms the basis of client satisfaction (Boyd & Chinyio, 2006). Of course, a mismatch between reality and expectations may simply arise from unrealistic client expectations, however, given the unique features of many buildings, a mismatch may also derive from professionals lack of understanding or competence in performing some parts of the job, which generates limitations that the professionals may be reluctant to admit (Emmitt & Gorse, 2007:34). Accordingly, legal disputes from building failure often originate from a mismatch between expectations and knowledge (Emmitt & Gorse, 2007:34). In this context, Boyd & Chinyio (2006) summerize the following aspects which should be taken into consideration:

- Clients see building differently from the construction industry
- Clients are not unitary
- Building involves organizational change in the client.
- Change exposes gaps and contradictions in the client.
- Building involves unknowns that are not yet formed
- Building is emotional for the client.

Central to these issues is the availability and transfer of information. Winch (2008:209) frames this via the Johari Window (figure 4.3.1.1), where distinction is made between (1) *Public* information, which is known and understood by both the client and designers, (2) *Private* information that is only known by the client, (3) *Blind* information that is only known by the design team and (4) *Unknown* information, which is unknown to both the client and designers.

The briefing/programming process aims to convert private and blind information into public information via the process of disclosure, where the client releases information and the designers in return provides feedback (Winch, 2008:209). However, there is still a rather large zone of unknown information that may (or may not) become available as the project unfolds. Also, both the client and the design team may withhold information for a number of reasons: on the client side it may be due to lack of appreciation of the
relevant of the information, internal disagreement, lack of trust and lack of capability and resources for communicating the information (Winch, 2008:209). The design team may withhold information for the same reasons as the client, but it may also be caused by a perceived lack of maturity of ideas (Winch, 2008:211).

Figure 4.3.1.1: The Johari Window (source: Winch, 2008:209)

The design and construction process is influenced by the client’s ability to cope with the “knowledge gap” during the project, since inability to handle uncertainty can lead to communication difficulties and irrational behavior. As an example of this, the client can flip between enforcing his power position, towards the building professionals, and resigning to a dependency position acknowledging the professionals expert opinion (Boyd & Chinyio, 2006). Thus, psychological aspects and human emotions can add to the uncertainty in a chain of consequences.

This has also been highlighted by Sunding & Ekholm (2003), who argues that psychological defense mechanisms constitute a fundamental problem in construction teamwork. Accordingly, Boyd & Chinyio (2006) make a connection to Argyris and Schön’s ‘Model 1’ assumptions (see chapter 4.2) where people often fail to acknowledge that they do not follow their personal ‘espoused theories’ for guiding their actions (Argyris, 1977). Also, a person’s perception of a given situation is dependent on preconceived expectations and past experience, which therefore distort communication (Boyd & Chinyio, 2006).
Client involvement

Regarding the extent of client involvement, research\(^9\) indicate that it is perceived to be beneficial to involve the customer representatives in the beginning and the end of the early conceptual design phase, whereas it is considered to be undesirable and resource demanding to involve the customer later in the process of detailed design and production (Beim & Mossin, 2004). In addition, Yu et al (2007) found that it is generally perceived to be beneficial to include client representatives, facility managers and users in the briefing phase (pre-project phase). However, the extent and purpose of involving the customer may vary considerably. Accordingly, Beim & Mossin’s (2004) showed that some design firms had developed interview techniques and methods to explore client needs as a source of inspiration and a basis for developing customized design (e.g. Beim & Mossin; 2004:52), while another company seemed equally concerned with the client’s (in-)ability to make decisions as well as his design ‘incompetence’, which they had to deal with in order solve the task (Beim & Mossin; 2004:44-46). A third company did not directly involve end-users for the reason that “users do not want something in 5 years that they can already imagine” (Beim & Mossin; 2004:32). Accordingly, Orlikowsky (2004:92) state that it is not uncommon for designers (or managers) to avoid engagement with the users, based on the argument that simplistic requirements and concerns may prevent the designers from accomplishing “breakthrough ideas and breathtaking aesthetics”. However, in the research conducted by Beim & Mossin (2004), the benefits associated with customer commitment and co-responsibility was a frequent espoused reason for involving the customer. Yet, from the transcripts presented, it also appears that designers were well aware of their own competencies and opinion about good design and consequently the necessity of challenging the client and user groups. Techniques for doing this will be described in chapter 5.

4.3.2 Group dynamics theory

Generic patterns in group interaction

Within group dynamics research Bales’ (1950) Interaction Process Analysis (IPA) coding scheme has been very influential (Emmitt & Gorse, 2007). The IPA is a generalized instrument for observation of overt interaction in small groups ranging from two to around twenty participants. It was developed with the aim of finding some sort of pattern, when analyzing multiple comparable studies (Bales, 1950). Thus, it presumes that there are some similarities in human interaction and also some identical problems in

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\(^9\) Beim & Mossin (2004) performed an interview survey regarding user demands and design processes in eight design- and production companies
human relations. It does however not prescribe generalized solutions to these problems, because these would be context dependent and value laden (Bales, 1950). The method is briefly described in the following because the method itself represents interesting theory on group dynamics and it provides the background for understanding Bales’ research findings.

The IPA method is centred around the coding scheme shown in figure 4.3.2.1. The coding scheme is a compromise between theoretical adequacy and practical simplicity and has been established through theoretical deduction and empirical trial and revision (Bales, 1950). It is divided in the four categories A, B, C and D, which are the major categories of asking questions (C), giving answers (B) and all kinds of positive (A) and negative reaction (D) in a problem solving situation. One can also distinguish between
the area of task oriented problems (B and C) and the area of the social-emotional problems (A and D), which the group members alternate between in the problem solving process. Finally the twelve subcategories can be viewed as six pairs, which are concerned with different aspects or phases of the problem-solving process, which are to be tackled with a varying degree of emphasis in order to maintain the “interaction system” (Bales, 1950). The six pairs of communication acts are labelled a, b, c, d, e and f and has to do with problems of respectively communication, evaluation, control (of direction), decision, tension reduction and reintegration.

Looking at a large sample of small, leaderless discussion groups the average profile shown in figure 4.3.2.2 has been established. It shows that positive reactions are much more likely to occur than negative reactions. Also it shows that suggestions and statements (of opinion and orientation) are much more likely to occur than inquiries for suggestions, opinion and orientation. Bales explains this with the fact that questions tends to inhibit the person in going on expressing his or her own opinion or ideas, thus restraining the person from the opportunity to increase status or redefine his or her identity, which is handed over to those who answer the question. Thus in highly competitive groups there will be a tendency to avoid questions – only those with a fixed high status or those who have accepted a low status can afford to ask questions (Bales, 1999:246). Accordingly, as mentioned earlier, professionals are often reluctant to openly admit the limitations of their knowledge and ask for help. Thus, in their study of construction

![Interaction Profile for the Average of All Interactions for Large Numbers of Small Discussion Groups](image)

*Figure 4.3.2.2: Average IPA profile (Bales, 1999:239).*
management and design (M&D) site progress meetings Emmitt & Gorse (2007) did not record one single (overt) request for help. Research suggests that help-seeking is more likely to occur in informal conversation with equal status co-workers, with which a relationship has already been established (Emmitt & Gorse, 2007).

The IPA method assumes that some pattern of attention to the six types of problems can be found in a group problem-solving process (Bales, 1950). An initial hypothesis was that these functional problems are interrelated or nested in the sense that the solution to the preceding problem (e.g. communication) is a functional prerequisite for solving the next (evaluation), which is then the prerequisite for solving the following problem (control) etc. (Bales 1950:132). This has been known as the equilibrium theory (Emmitt & Gorse, 2007).

**Some critical reflections**

This hypothesis regarding a functional pattern in social interaction may reflect the setting that Bales was part of at Harvard University, which included the influential structural functionalist Talcott Parsons, who found inspiration in Bales work to develop the AGIL scheme, which describes four functional imperatives for society: Adaption, goal attainment, integration and latent pattern maintenance (Andersen & Kaspersen, 1996). Hence, some researchers have argued that Bales IPA is a tool to prove a theory by structuring observations to fit the underlying hypothesis (Emmitt & Gorse, 2007). Also, it should be acknowledged that a lot goes on in group interaction, which cannot be retained via the IPA method (or sound recording for that matter).

Thus, at the end of his career Bales arrived at the conclusion that the interaction system, which humans develop over time, is mostly an invisible, dynamic system of conflicting and cooperating values (Bales, 1999:191). Therefore, Bales developed an array of 26 fundamental, empirical-based (generic) values that interplay in group interaction, which can be described and to some extent account for group behaviour over a span of time. Thus Bales has together with co-researchers and consultants developed the SYMLOG method that via observation and retrospective evaluation retrieves each group-member’s rating of the 26 values in relation to the “self”, “the others” and an “ideal”, which can then be mapped and held up against an empirical based ‘optimum’ distribution of group values in relation to effectiveness. However, the SYMLOG method is relatively complex and requires a lot of training to perform and consequently it hasn’t been widely used since its conception (Emmitt and Gorse, 2007). Also, one could question the causal relationship between the highly subjective assessment of “effectiveness” and an “optimum” distribution of values.

10 SYstematic, Multiple Level, Observation of Groups
However, through his extensive research, Bales (1999) came to believe that the interac-
tion-system is on the edge of chaos because of the multiplicity of values and influences
on the system; values which are not only oriented towards the task at hand, but to a
great extent are linked to each individual’s attention to self-identity (Bales, 1999:162).
Thus conflict is very likely to happen because, attempts of leadership in some direction
is likely to emphasise some values over others (Bales, 1999:210). This kind of dynamic
inter-play makes it hard to find any generalised (linear) pattern when observing a spe-
cific case of group problem solving.

**Generic patterns revisited**

Nevertheless when looking at multiple groups over a period of time some naturally oc-
curring regularity of behaviour or ‘systemic emergents’ can be observed, which relates
to the maintenance of the interaction process. Thus, Bales found that in small, initially
leaderless groups, formation of status appeared and a division of labour as well as splits
in subgroups appeared. The subgroups sometimes became openly in opposition to each
other (Bales 1999:171). A ‘task leader’ often emerged who talked more than any other
participant and was low on being ‘liked’ in the group (Bales 1999: 168). In addition a
‘social leader’ appeared who talked less, but scored higher on being liked (Bales
1999:166). Bales also found a repetitive phase of “increasing conflict, argument and
tension, eventually interrupted by jokes and laughter, and then followed by signs of re-
laxation and friendly remarks” (Bales 1999: 167). According to Bales this observable
group behaviour centre around three fundamental problems of control (Bales 1999:173):

1. Control of dominance, status, and power
2. Control of unfriendliness
3. Control of problem-solving efforts toward effective solution

The problem areas listed in the IPA coding scheme are all sub-problems to these more
fundamental problems (Bales, 1999:212). Struggle for dominance is not likely to appear
initially, when participants meet for the first time, but soon after some degree of struggle
for status and dominance is likely to set in (Bales 1999:178). This may result in a
consensus about the establishment of status order, but if acceptance is not achieved it
can seriously damage group effectiveness. Often group members with real problem-
solving abilities have to compete against group members who exercise dominance based
on other sources of power than problem-solving competence (Bales 1999:174). Solu-
tions to the tree problems are interdependent because resources are limited and therefore
a balance must be struck in the allocation of attention towards each of the problems.
Thus, if focus primarily is directed towards the establishment of friendly relations, less
attention is given to task-oriented problem solving. Conversely if all focus is directed
towards the task at hand interaction is likely to become unfriendly and status-struggles will appear (Bales 1999:177). Increasing tension may then be counteracted by joking to release tension by laughing followed by increased attention directed towards the establishment of friendly behaviour. After some time, focus may again be directed towards the task at hand (cf. the repetitive phase mentioned above).

This corresponds with the (logical) sequence of group problems Bales found in an observational study using the IPA coding scheme (and which fits the equilibrium theory): problems concerned with information had their peak early in the process, problems of evaluation peaked a bit later, then problems of control (of direction of action) had their highpoint, then decision, tension and problems of reintegration had their culmination in the latter part of the process (Bales 1999:223-238).

The particular contextual influences
As Bales (1999) also point out, one should however be cautious about making these generalisations about group problem-solving. As an example of this, Bales shows how military officers go about problem solving in a much more efficient way, than newly formed leaderless groups, because the officers are trained to minimize the influence of problems of dominance and friendliness (Bales, 1999:231). When looking at a specific case, there are according to Bales four major sources of variation due to (1) variations in personality, (2) variations in social organization and (3) culture, and (4) variations in the type of problem and situation (Bales, 1950:26). Variations in personality can for example be observed when comparing groups of children and adults (Bales, 1950:26). Variations in “organization and culture” can be seen, as mentioned above, when comparing groups of military personnel with groups of civilians (or construction professionals). In addition, the size of a group matters. Accordingly, Emmitt & Gorse (2007:30) suggest that the ‘ideal’ group consists of 5-6 members, whereas Philips & Philips (1993:540) based on their experience recommend 7-15 people. Also, newly formed groups show a different pattern than established groups (Emmitt & Gorse, 2007:17). In order to work effectively, participants need to spend some time interacting and thereby gain knowledge of other participants’ expertise, so that roles and responsibilities for problem solving can be established (Emmit & Gorse, 2007:42). This connects to variations in “type of problem and situation”; Accordingly, when looking at construction projects, dominance or informal leadership in group interaction is likely to change over time, as the various professions (task-based) expertise becomes more or less relevant at different stages in the process (Emmitt & Gorse, 2007). Thus, research has shown that actors stick to their professional expertise and (not surprisingly) involve themselves more when it is needed (Emmitt & Gorse, 2007). Hence, the architect is likely to be dominant in the early stages of the process, whereas the contractor representatives are more influ-
ential in the latter part of the process. In addition, Philips & Philips (1993) suggest that groups that feel a high degree of (outside) threat (they are failing to meet their goals, exposed to high competition etc.) are likely to be less comprehensive in their exploration of options and criteria, when aiming to solve their problems. Also, variations due to “type of problem” may be seen when comparing the problem-solving process in a group of people, who are to come to terms with a dispute of some sort, and a group of people who are to help and advise each other. It is also noteworthy that an un-tidy, ill-arranged meeting room can have a negative effect on group problem solving (Philips & Philips, 1993). Finally, time constraints have a tendency to generate higher levels of task-based interaction and autocratic behaviour (Emmitt & Gorse, 2007).

In continuation of this, it should be pointed out that construction teams are not leaderless and so one may fundamentally question the applicability of Bales’ research, which primarily focus on initially leaderless, non-commercial groups and the development of informal structures. However, researchers have found good use of Bales IPA within construction project settings (Emmitt & Gorse, 2007) and there are strong indications in the literature, which point at informal, emergent interaction structures as being quite influential. For instance, Pietroforte (1997:79) state that “authority unfolds more from demonstrated capabilities and participation in problem-solving than from the legitimation of the contractual provisions”. In addition, when looking at crisis situations in construction projects, Loosemore (1998) found that even though formal contractual distribution of responsibility (and leadership) was established – as well as formal routes of communication – behaviour was likely to be directed by tactics to achieve power in which emergent coalitions (sub-groups) and informal communication routes were established, whereas formal rules were used or bent to the extent participants could benefit from them. This is however not to say, that formal contracting relationship and corresponding hierarchy within a project setting is completely without influence.

Thus, it should be pointed out that Bales primarily focus on the development of internal structures in group inter-action, whereas one should equally consider external influences (Emmitt & Gorse, 2007:52). Accordingly, Loosemore’s findings seem indicative of the competing external influences from the structures within the participating companies. In a construction setting, these structures are likely to have a stronger influence on participant behaviour than those established within the project (at least when interests collide), because of the temporary nature of the task.

11 However, somewhat more uplifting, Loosemore (1998) also found that considered behaviour toward other participants – in a crisis situation – can create trust and thereby strengthen cohesion in the team.
Based on the above discussion, it can be concluded that there are various factors effecting group behaviour that, in a particular context, will distort the generic linear pattern described by Bales and ultimately make it hard to establish a complete understanding of group interaction (Emmitt & Gorse, 2007:37). Also, the above discussion can easily lead to a more universal and (probably endless) philosophical discussion regarding the extent of actor autonomy and the influence of external structures. However, it seems to be a well established fact that over time, a group will develop ‘group norms’, which to a large extent can structure behaviour and seem vital for effective group work (Lawson, 2006:244; Emmitt & Gorse, 2007:45). Accordingly, the following section will briefly present theory on the development of group norms.

**Group norms**

Development in group behaviour depends on the frequency and length of time the participants meet (Emmitt & Gorse, 2007). The development of group norms are likely to emerge with some degree of initial conflict as individual interests may collide in the forming of compatible group roles and goals (Lawson, 2006, Emmitt & Gorse, 2007). Thus Lawson (2006) refers to the phases of; ‘forming’, ‘storming’, ‘norming’ and ‘performing’. Accordingly, unidisciplinary groups exhibit different patterns of behaviour than multidiscipline groups, which according to Emmitt & Gorse (2007) is likely to be a result of different degrees of value convergence. The norms can take their outset in influential members’ behaviour or statements, experiences from earlier group work, repetitive patterns of behaviour and critical events, which have been overcome by the group (Emmitt & Gorse, 2007). Norms may manifest in the way participants dress, how they speak, meeting procedures and seating arrangement and behaviour in general (Lawson, 2006; Emmitt & Gorse, 2007). The social structure of the group can be so powerful that it overrules a member’s expertise and experience (Emmitt & Gorse, 2007). Also, individual members may suppress their opinions and values in order to assign to group expectations (Emmitt & Gorse, 2007). Accordingly, a person may behave very differently within the group than in other settings and thus demonstrate ‘multiple identities’. On the other hand, group norms can be very sensitive to entries by new participants as well as changes in context (Emmitt & Gorse, 2007).

The development of group norms can be very beneficial because of the establishment of roles and ‘predictable’ behaviour, which often translate into effectiveness in problem solving (Lawson, 2006; Emmitt & Gorse, 2007). However, strong cohesiveness in a group may also become a disadvantage, if it develops into what is categorized as ‘groupthink’. According to Emmitt & Gorse (2007:75) “Groupthink occurs where individuals, within the group, do not agree, but fail to show their concerns because of group pressure or they believe the majority of the group are in agreement”. Accordingly, a
group may lose touch with the “real” world, if participants fail to challenge dominant perspectives and only reinforce each other in the rightness of these viewpoints. This may connect to the fact that groups can create a sense of belonging to its members and it can be very exhilarating to be part of a team (Lawson, 2006). So, individuals may be reluctant to expose viewpoints that can disrupt the harmony in the group. Accordingly, research suggests that a balanced level of ‘conflict’ is beneficial to group problem solving as long as it doesn’t amount to full dispute and adversely behaviour (Emmitt & Gorse, 2007). In the context of equilibrium theory, positive social-emotional interaction needs to supplement (conflicting) task-oriented and negative social-emotional interaction, in order to maintain relationships.

**Group effectiveness**

If one is to generalise, Bales (1999) argue that effective problem solving is only possible to the extent that the following essentials are satisfied (Bales, 1999:80):

1. The individuals who hold power and have the resources can be brought to lend their support and cooperation to those who are making task-oriented efforts and truly have the abilities to solve the problems of the group tasks
2. Those individuals whose main concern is the maintenance of relatively greater equality and group solidarity can be brought into cooperation with the individuals who work at task-oriented efforts; and
3. The majority coalition of the whole group can be coordinated by a competent leader, or a set of cooperating leaders, who has been given legitimate authority and power

This also implies that the earlier mentioned ‘task-leader’ should cooperate with the ‘social leader’ (Bales, 1999:255). However, the central condition for effectiveness is that a majority of the group members consider the three problems pointed out (control of dominance, unfriendliness and problem-solving efforts) as well as their individual “value positions” and formulate solutions that are mutually convergent and consistent (Bales, 1999:180). Thus according to Bales, third party observation and feed-back can trigger participant reflection and change behaviour in a more positive direction (Bales, 1999:186).

Based on 10 case-studies of construction management and design (M&D) team site progress meetings, Emmitt & Gorse (2007) found – via using the IPA method – that projects that were considered successful (within budget, on time and no legal conflicts) had consistently and significantly higher levels of requesting task-based interaction and relatively lower levels of giving task-based communication acts compared to unsuccess-
ful projects. This indicates that groups consisting of participants that are likely to ask each-other for suggestions and relevant information instead of just ‘giving’ potentially premature suggestions for (or determining) a course of action, have more chance of succeeding (Emmitt & Gorse, 2007). With regard to socio-emotional group interaction, all of the ‘successful’ projects had significantly higher levels of positive socio-emotional interaction. This is consistent with earlier findings, which suggests that positive socio-emotional communication acts are important to ease tension and build relationships. However, as Emmitt & Gorse (2007) also point out, this finding may simply reflect that the actors were aware of the successful trajectory of the project(s). With regard to negative socio-emotional interaction, the results were not consistent. Thus, some successful projects had significantly lower levels of negative socio-emotional interaction than unsuccessful projects, whereas one project in particular, that was considered successful, had the second highest level of disagreement. However, this corresponds with earlier findings (mentioned in the sub-section Group Norms), which suggests that conflict can be beneficial to ensure thorough reflection on issues and avoid ‘groupthink’, as long as sufficient levels of positive socio-emotional interaction are used to ‘recover’ relationships (Emmitt & Gorse, 2007). Accordingly, the high level of negative socio-emotional interaction was, in the successful case, associated with considerably higher levels of positive socio-emotional interaction than in unsuccessful projects.

In connection to this, it is noteworthy that in general the levels of both positive and negative socio-emotional interaction were considerably lower in the ten case-studies, than what has been found in previous studies. This may be an indication of the temporary nature of M&D teams that induce formal and task-oriented, business like communication, but hampers the development of relationships and group norms, which – as mentioned earlier – is considered vital for group effectiveness (Lawson, 2006; Emmitt & Gorse, 2007). However, it may also be due to the business environment, since earlier applications of the IPA mainly has taken place in laboratories and non-business environments (Emmitt & Gorse, 2007).

Finally Emmitt & Gorse (2007) found that ‘successful’ groups used a ‘wider variety’ of communication acts; meaning that they, besides asking more questions, used more extreme socio-emotional acts. The causal connection may be that extreme socio-emotional interaction can provide focus in group work, because participants are more likely to pay attention to extreme communication acts (Emmitt & Gorse, 2007).

Bales’ (1999) categorization of a ‘task-leader’ and a ‘social leader’ corresponds to another noteworthy trend within normative management theory of group dynamics, which particularly has been brought forth by Belbin (his work actually builds on Bales’ research). Belbin’s team-role theory (e.g. Belbin 1981, 1993) suggests that certain con-
figurations of roles or personalities can increase group ‘effectiveness’. However, this is one interesting topic that will not be treated further within this research project. This is for the sake of delimitation and also because the topic has more to do with competences and attitude than communication and group values (although these are interrelated). It may also be noted that while Belbin’s team-role theory is widely used by managers and consultants, it has been argued that the theory rests on limited empirical evidence (Prichard & Stanton, 1999; Furnham et al; 1993). In continuation of this, it should be pointed out – as the chapter on ‘contextual influences’ indicate – that the extent of variables affecting group productivity seems almost endless. Accordingly, McFadzean & Nelson, (1998:6) makes the following comment on factors of group effectiveness:

The group level could include factors such as structure, composition, dynamics and size. Likewise, group composition could be broken down into variables such as leadership, team roles, expertise and so on. Leadership, team roles and expertise could also be broken down into constituent variables, and so it goes on.

4.3.3 Summary

In conclusion, communication is not only a matter of conveying information, it depends on the establishment of relationships and the extent of knowledge possessed by the actors, since this determines their ability to decode information and create a shared system of meaning. Also, in relation to design management, it is important that actors are aware of the relevance of the information they hold. Altogether, this poses some challenges especially in one-off construction projects with inexperienced clients and multiple stakeholders. However, face-to-face meetings may be instrumental in overcoming communication problems. Nonetheless, group dynamics theory highlight that group members pay as much attention to status and self-identity as information sharing and problem-solving. Struggles over values are likely to appear. However, over time group effectiveness is likely to increase as relationships are built, norms emerge and the actors settle with their negotiated role-frames. However, the harmony may be disrupted by the exclusion or inclusion of new group members – as it is frequently the case in construction projects. On the other hand, too much cohesiveness can be harmful if it develops into groupthink. Finally it should be noted that group behaviour is very difficult to predict given that the extent of internal and external influences are numerous. It seems however that simple techniques such as asking questions and third party observation (and feed-back) may stimulate reflection and be generative for effective group problem-solving.
5 Design Management concepts

As described in the introduction, the research has been problem-driven, aiming to provide instrumental recommendations for design management. However, these recommendations should not be developed with blinkers in relation to established concepts. For this reason the present chapter is included to provide some overall considerations about different groupings in design management literature and a review of relevant design management concepts. This includes a description of the following concepts/approaches (1) Briefing & Architectural programming, (2) Value management & Value engineering (3) Values-based management (4) Lean Product Development and (5) Lean Construction Design. A secondary reason for describing these concepts is that they contain techniques, which have been used in some of the case-studies. Thus the chapter also provides background-knowledge to ‘understand’ the case-studies. However, if the reader is familiar with these concepts, it may be sufficient to read the introduction (Ch. 5.1 and 5.1.1) and table 5.7 in the last chapter that summarizes key-aspects and tools. The positioning of the chapter within the overall research design is illustrated in the figure below:
5.1 Introduction

Design management is a broad notion which encompasses different approaches and techniques corresponding to different views of designing (Ballard & Koskela, 1998; Sebastian, 2004; 2005) within different industries. In the following, design management refers to any attempt of managing the process of designing whether it is in construction or any other industry. When using the terms ‘construction design management’ or ‘architectural management’ focus is delimited to management of designing in the construction industry or architectural practice (these two concepts are nested within the broader notion of ‘construction management’). The first “methods” for designing were conceived in the 1960’ies in line with a contemporary urge to ‘scientise’ design (Cross, 2007). Likewise, the term architectural management has been used since the 1960ies, but it was not before the early 1990’ies that it became an academic field of its own – distinct from (industrial) design management (Emmitt, 1999, Emmitt et al, 2009). Consequently the literature is relatively sparse. Nonetheless, misconceived or lack of design management is by various authors perceived to be a root course of many of the problems experienced in the construction industry (Ballard & Koskela, 1998; Freire & Alarcón, 2002, Sebastian, 2004). At the same time, it is acknowledged that especially the early conceptual design phase is very difficult to manage – at least from a ‘planning and control’ management perspective (Smith et al, 1998; Sebastian, 2005; Winch, 2008). Some of the suggested reasons for this state of affairs are the many stakeholders with conflicting and changing requirements, which are interpreted differently by various designers, the uncertainties associated with changes in the project environment, which includes the rapid pace in technology change and associated changes in scope of possible solutions, the iterative nature of designing and the difficulties associated with aligning the contribution of various specialists (Ballard & Koskela, 1998; Formoso et al, 2002; Sebastian, 2005; Winch, 2008). In this chapter some propositions for categorising different perspectives on construction design management is provided, together with a review of corresponding management techniques to accommodate these perceived problems.

5.1.1 Different perspectives

Winch (2008) argues that the earliest stage of architectural designing, taking place in the briefing or architectural programming phase, cannot be managed by ‘outside’ managers. Thus, as described earlier, the experiential process cannot be meticulously planned as new meanings are likely to arise with the tentative design moves and ongoing reframing of the situation. Accordingly, Winch (2008) argues that the client will need to trust the designers’ ability to self-manage in the early stage and rely on a ‘propose and dispose’ process, in which designers creatively work out different alternatives that can be reviewed in relation to their fit with the ‘primary generator’ (see chapter on
designing theory). However, some stage-gates® can be incorporated to perform these reviews collectively (Winch, 2008, see Appendix 1 on design models). In addition, managers may facilitate the collection of information and establish the setting; including stakeholder analysis and establishment of communication and organizational structures etc (cf. phase activities in figure 3.2.2.1 and Blyth & Worthington, 2001). According to Winch (2008), it is not before the problem definition has become more articulated (‘tame’) that more formalized management concepts such as value analysis and quality function deployment (which will be described later) can be adopted.

Managing the product, the process and the organization

Equivalent to this, Sebastian (2004, 2005) is not too optimistic about current construction design management concepts. Sebastian (2005) makes an overall distinction between managing the product, managing the organization and managing the process (Sebastian, 2005). The first category includes those managers/scholars who primary focus on the psychical product by making requirements explicit and evaluating the design against these. According to Sebastian (2005) this approach is weak because the situation and performance criteria are likely to change. Managing the organization has to do with the administration of the architectural office and organizational decision-making. This approach is also considered to be weak, because of its limited range (administration of the office) – it is not directly involved with the act of designing (Sebastian, 2005). The process view has mainly to do with coordination of design tasks. The weakness of this approach is that it assumes that a good process will automatically lead to a good product (Sebastian, 2005). However, in an earlier paper, Sebastian (2004) differentiates between three categories within the process view: (1) the design-methodological approach, (2) the engineering instrumental approach and (3) the social-psychological approach. The first approach is based on a belief that analytical methods can facilitate the creativeness in designing. However, the approach has never gained acceptance in practice and coordination is not considered (Sebastian, 2004). The Engineering instrumental approach considers designing as a rational problem solving process; basically it is about identifying the problem and the boundary conditions for its solution, which should be explored to develop an optimal design. Ill-defined, complex problems are broken into manageable parts and solved separately based on a system-thinking logic. According to Sebastian (2004) the Engineering instrumental approach is the predominant view in construction management and it includes methods developed in the lean construction community as well as the aforementioned attempts to develop process models for design management. However, Sebastian (2004) argues that the third approach, the Social psychological approach, is a development with great potential. It sees architectural design concurrently as (1) a cognitive process, (2) a social process, and, drawing on the work of Schön, (3) a reflective practice (Sebastian, 2004). This
view advocates the creation of a stimulating context for the design team members as well as providing the tools for their work and the creation of a common language (instead of rigidly planning, coordinating and follow-up). It seems that this perspective largely builds on the theories described in the theory chapter (chapter 4.2 & 4.3), except for the ‘cognitive’ view. The cognitive view builds on cognitive psychology and has to do with the mental process of creativity. This is a subject that the author has delimited himself from. However, Cross (2007) highlight Lawson’s (2006) “How designers think” as a main contribution to the ‘cognitive view’ – this book has been cited extensively in the theory chapter (4.2).

Managing transformation, flow and value

Lean Construction advocates would probably not agree to solely categorize their tools and concepts into the engineering instrumental approach described by Sebastian (2004). Social-psychological features, such as group facilitation and empowerment, seem embedded in the concept of the Last Planner System of Production Control (LPS). Also, lean construction pioneers Ballard & Koskela (1998) clearly acknowledge the shortcomings of a system-thinking approach which divides complex tasks in work breakdown structures presuming that optimising the parts (the specific identifiable operations) will optimize the whole (the system). Instead they propose another range of complementary views on design management that sees design as a (Ballard & Koskela, 1998):

1. Process of converting inputs to outputs
2. Flow of materials and information through time and space

This line of thinking has later on been conceptualized in Koskela’s (2000) Transformation-Flow-Value (TFV) theory of production, which has become quite influential in the Lean Construction community. The function of the transformation view is to get the job done, the function of the flow view is to minimize the amount of unnecessary work (waste) and the function of the value generation view is to make sure that customer requirements are met in the best possible way (Koskela, 2000). Thus, the three views are complementary, but they are not equally explored. The best known principles in management are derived from the transformation view, whereas the flow view is gaining acceptance (especially in the lean construction community) and the value generation view is the least explored perspective among the three (Ballard & Koskela, 1998). The latter has been confirmed by Jørgensen (2006) in a more recent publication.

Examples of predominant design management tools, which are linked to the conversion/transformation view, are work breakdown structures (WBS) and critical path
method (CPM), whereas concurrent engineering (CE) and the design structuring matrix (DSM) primarily represent the flow management view, and finally value management (VM) and quality function deployment (QFD) are concepts representing the customer value generation perspective (Ballard & Koskela, 1998; Koskela et al, 2002). Most of these concepts and tools for design management will be described in more detail below.

Focus within this chapter
Considering these two ‘landscapes’ of design management proposed by Sebastian (2004, 2005) and Ballard & Koskela (1998), some delimitation can be made in relation to the current study. The thesis has already been delimited to focus on the project level, which excludes the management of the architectural office (see chapter 2). Within the process view of designing, the design-methodological approach is omitted because it is considered ill-suited as a tool for coordination and apparently is irrelevant to practitioners (Sebastian, 2004). Likewise, the transformation and flow views of design are not considered to be main focus areas, because these perspectives are more concerned with problem solving in the latter stages of designing, where problems have become ‘tame’. On the other hand, lean design tools will be described to some extent because they are used extensively in one of the case-studies. The remaining perspectives, the product and the value-view of designing, in addition to the social psychological approach, are considered more relevant to the current study. The product view includes the literature on Briefing and/or architectural programming. The value-view includes the concepts of Value Management, Value Engineering and Quality Function Deployment, which will be described below. However, the social psychological view is not a well developed concept (Sebastian, 2004). Nonetheless, as noted above, the grounds for the perspective have already been somewhat described. In addition, Values-based Management will be reviewed as an instrumental concept that leans towards this perspective. Consequently, the remaining chapter is structured in five sections:

- Briefing and architectural programming
- Value Management & Value Engineering
- Values-based management
- Lean Product Development
- Lean Construction Design (including QFD)

Each section is structured in the following overall headings: (1) Introduction, (2) Methods and tools and (3) Critical perspectives. A table (table 5.7) is provided at the end of the chapter, which summarizes key-aspects of all five concepts.

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12 VBM breaks with the idea of rules and procedures and advocates the creation of a stimulating context
5.2 Briefing and Architectural Programming

With reference to the phase-model, the pre-design phase corresponds with the UK briefing phase and the American notion of architectural programming. In outline, the purpose of briefing is to determine the overall requirements and conditions for a potential building project, which are presented in a document called the brief (or programme). With reference to the Johari window described in chapter 4.3.1, the purpose is to convert unknown and blind information into public information (Winch, 2008). However, the literature can basically be divided into two schools of thought: Those who aim at establishing a rather fixed brief document (in the pre-design phase or concept phase) and those who consider briefing/programming as a dynamic process that transcends all project phases to support ongoing discussion and clarification of requirements (Othman et al, 2004; London et al, 2005; Yu et al, 2007). Whereas the former perspective was predominant in the 1980ies, the latter perspective gained increasing support in the 1990ies (Green, 1996) and is now the predominant trend (Ryd, 2004) – at least in the literature. In addition, authors often refer to two distinct stages of briefing: strategic briefing and project briefing (Green & Simister, 1999; Kamara et al, 2001; Yu et al, 2007). The starting point of the first stage can be difficult to determine (Ryd, 2004) and it may not include any designers or external consultants. However, the strategic briefing stage is concerned with the client’s strategic goals and needs. As a response to this, the outcome of the project briefing stage is the designers’ initial ‘translation’ of the brief into more technical requirements. The project brief then forms the basis for design. In addition, it is often argued that since the process of briefing sets the stage for design and everything that follows, it is of vital importance to client value creation (e.g. Smith et al, 1998; Yu et al, 2007).

5.2.1 Methods and tools

Gathering exploring and sharing of information

Grouped within the ‘dynamic’ view of briefing, Blyth & Worthington (2001) stress the need to ‘interrogate the demand-side’, and even investigate areas which the users would normally keep hidden e.g. information that is sensitive in relation to competitors (future strategic plans). In order to indentify the needs of the client and users, Blyth & Worthington (2001) list the following techniques:

1. Examining company records (business plans, organizational chart, workflow diagrams etc.)
2. Surveying existing facilities (to figure out how these are actually used)
3. Excursions to facilities with similar purpose (together with client and user representatives)
4. Examining comparative benchmarks
5. Interviews, focus-groups and questionnaires (incl. users, facility managers etc)
6. Workshops (e.g. value management workshops)
7. Simulation and gaming (feed-back via sketch designs, computer modelling, display of precedents, mock-ups and role-play)
8. Option appraisals (risk and feasibility analysis of different options – this may reveal or eliminate ‘needs’)

It is noteworthy, that the above list contains many ‘indirect’ techniques to learn about client and user requirements. Thus, the brief-taker should not only ask the client and users about their needs and requirements; it is likewise important to explore the business processes and the ‘strategic context’ of the client (Green & Simister, 1999). In fact, some scholars and practitioners argue that the brief-taker should be cautious about asking what people want (item 5), because it may result in unachievable wish-lists, which eventually will lead to disappointment (Blyth & Worthington, 2001; Yu et al, 2007). Some users may even act in a tactical manner and try to incorporate extra ‘wish-list’ items that they can bargain with (Yu et al, 2007). In addition, if the client organisation is only asked about needs and wants; valuable information may be withheld simply because the client representatives do not recognize its importance (cf. the Johari window, chapter 4.3.1).

Instead, Blyth & Worthington (2001) recommend asking what people do and what they are likely to do in the future. Thus, in relation to item 2 and 8, it may turn out that more space is in fact unnecessary if existing facilities are utilized in a better way. Accordingly, Othman et al (2004) argue that a no-build alternative should always be considered. Consequently, it is recommended to define a ‘need’ as a solution-neutral ‘requirement’ (Kamara et al, 2001; Blyth & Worthington, 2001). The same rationality somewhat underlies the workshops model where values are considered – not solutions. On the other hand it should be stressed that requirements are not synonymous with values.

In addition, as a specific tool to explore the ‘problem situation’ and stimulate discussion, Green & Simister (1999) – inspired by Checklands Soft System Methodology (SSM) – suggest the drawing of a ‘rich picture’ based on the information obtained. This is a cartoon-style drawing that, for example, may illustrate systems and subsystems of the client organization, the surrounding environment and the various links between stakeholders and their interests, including the ‘myths and meanings’ that the project team ascribe to these. According to Green & Simister (1999) this technique should, however, not be used separately from the larger framework of SSM.
In relation to item 6, Yu et al (2007) found that many practitioners believe that workshops are vital for the establishment of communication between stakeholders. Accordingly, Ryd (2004) describe how the brief documents need to be supplemented with verbal explanation at several stages during the project process. Yu et al (2007) also recommend assessment of stakeholder saliency and interests prior to the briefing process. This connects to the topic of value-management, which will be described in more detail below.

In relation to item 7, the famous architect Frank Gehry describes in Boland & Collopy (2004) how Gehry Partners in the early stages of a building project produce multiple physical models – each very different from the other – which are presented to the Client to get a reaction. Accordingly, they are not refinement of the same idea but “tools for thinking” (Boland & Collopy, 2004:14). Gehry tries to challenge the client with very different concepts and he does this based on the experience that when clients initially describe their needs, it is usually (unintentionally) a representation of what they already have (Boland & Collopy, 2004:23).

Accommodating change

However, because information may be almost unlimited, careful consideration should be made regarding the relevance of information (Blyth & Worthington, 2001). Accordingly, in the very early stage, ‘strategic’ information should be collected (e.g. regarding site, number of occupants etc.), whereas more detailed information (e.g. type of security system) can be collected at later stages. To help the sorting out of relevant information, figure 5.2.1.1 may be considered. It aims to illustrate the typical lifespan and ‘change-ability’ of building elements (for office buildings). Thus, some decisions have a more significant, long-term impact than others. Accordingly, information and decision-making regarding for example office furniture may wait. The figure has been borrowed from the consultancy DEGW, who in the seventies emerged as a UK company that specialized in design and workplace planning. DEGW advocated ‘design for change’ and, accordingly, figure 5.2.1.1 may also be used as a framework for considering adaptability and flexibility13 (Blyth & Worthington, 2001).

Regarding the issue of change, which was touched upon in the theory chapter, Blyth & Worthington (2001) suggest that client organizations should consider the speed of growth of the organization and the nature of change (e.g. high/low change of work). In

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13 “Flexibility defines change that can be made quickly and with relatively little effort or cost (short-term and tactical) whilst adaptability is concerned with larger scale changes over longer periods of time (long-term and strategic)” (Blyth & Worthington, 2001:45)
addition, various techniques may be adopted to predict the future, including; projecting from past experience, scenario building (via asking ‘what if?’), focus groups and expert opinions, examining other organizations (trend-spotting) etc.

Figure 5.2.1.1: Lifespan of different building elements
(DEGW, obtained from Blyth & Worthington, 2001:47)

However, no matter how great the prediction effort is, the future may turn out differently than expected. Thus, very few projects are completed without any changes to the initial scope (Hansen in Othman et al, 2004:251). Therefore a balance should be struck between fitting the design to current and (expected) future users, while at the same time incorporating some basic flexibility and adaptability into the design. According to Slaughter (2001) there are three main design approaches to increase flexibility: (1) physically separating major building systems, so changes in one system do not affect the other; (2) use of prefabricated standard (de-mountable) components, so they are more easily replaced over time; and (3) over-capacity to incorporate a ‘buffer’ in sys-
tems. These kinds of strategies can have a great impact on future flexibility and life-cycle cost, with only marginal increases in capital cost (Slaughter, 2001).

In connection to this, one may consider the following drivers, which according to Othman (2005) are the 10 most influential drivers (out of 30 investigated) on brief development/change:

1. Stakeholders change project requirements and have second thoughts at later stages
2. Uncoordinated and incorrect construction documents
3. Brief information is still being given during later design and construction stages
4. Materials are no longer available in market or better substitute materials are identified
5. Lack of information provision
6. Meeting new technology changes
7. Lack of regulatory up-dating
8. Project users are not involved in the briefing process
9. Unforeseen conditions (e.g. soil conditions)
10. Lack of understanding different users’ culture and traditions

Most of the drivers were found to be within the control of the internal project stakeholders and it was typically during the construction phase that most changes occurred (Othman et al, 2004; 2005).

Accordingly, many scholars suggest an open attitude towards change, where both consultants and clients acknowledge the inevitability of change and try to embrace it in a positive manner (Othman et al, 2004; 2005; Blyth & Worthington, 2001; London et al, 2005). This is the reasoning behind the Dutch concept of Open Building, which builds on the first approach to achieve flexibility, described by Slaughter (2001), where buildings are designed with “minimum interference” between subsystems (Dekker, 1998; Wong, 2010). Likewise, Yu et al (2007) describe the project brief as a change-management document and Othman et al (2004, 2005) suggests the concept of Dynamic Briefing Development (DBD). DBD seems to revolve around a more structured decision-making process in relation to change, where value and risk is systematically considered (via value- and risk management techniques) and experiences are documented throughout the project life-cycle (including post-completion) to improve future briefing processes.

Of course, measures for adaptability and change should to be balanced in relation to the type of client – some client organizations may be almost static. In addition, ‘design for change’ may be somewhat irrelevant in smaller projects. Finally, to ensure progress, measures for adaptability can be combined with planned gateways (stage-gates®) that determine ‘last-responsible’ moment in relation to collection of information and decision-making (Blyth & Worthington, 2001). Thus, Yu et al (2007) recommend freezing
the brief prior to detailed design and argue that effective decision-making processes are the backbone of ‘effective’ briefing. They also stress that decision-making processes should be adapted to the individual aspects of each decision. More comments on decision making will be provided later.

5.2.2 Critical perspectives

However, to put things into perspective, Kamara et al (2001) found in a UK survey that; formal briefing procedures were only used in 42% of the (117) projects. In addition, ‘structured methodology to analyse and prioritize client requirements’ were only applied in 28% of the projects (Kamara et al, 2001:342). Also, in spite of the ideal of ‘solution-neutral’ presentation of requirements, it seemed to be common practice – at the time – to develop concept drawings before completing a statement of client requirements. Kamara et al (2001) argued that this was a general problem (especially from a concurrent engineering\textsuperscript{14} or fast-track perspective), and that ‘processing of requirements via sketches and drawings’ would have the following consequences:

- Reinforcement of the sequential ‘over the wall’ practice in which drawings, as representations of client requirements, are handed over from one designer to the next (instead of concurrent design based on clear goals and criteria)
- Drawings may skew focus away from needs and requirements and result in over-emphasis on technical design (drawing) issues.
- The designers may to a larger extent influence the design to their own liking, whereas the clients requirements may take second place

In addition, Kamara et al (2001) argued that the developments in state-of-the art briefing (at the time) did not sufficiently address the issue; structured methodologies still involved the processing of needs and requirements via drawings/solutions. Accordingly, Ryd (2004) describe how drawings in a case-study gave raise to different interpretations regarding the level of ‘fixation’. Thus, the actors had different views on whether the documents were to be regarded as final (technical requirements) or as a suggestion that was open to contractor ‘optimization’ (function requirements)? Ryd (2004) also found that the interpretation of the (strategic) brief was very much dependent on the specific actors who formulated the project brief and presented it verbally to other actors.

\textsuperscript{14} Instead of designing and producing in sequential stages, concurrent engineering is a concept where phases are overlapping and production is initiated much sooner to reduce project duration. Accordingly, many processes are running concurrently.
On the other hand, practice may reflect the theory of designing described earlier; in which problem and solution are seen as inseparable (Lawson, 2006). Thus the ideal of ‘solution-neutral’ statements of client requirements may be inappropriate as these are likely to be modified in the ‘conversation’ between problem and solution. Accordingly, Smith et al (1998:388) highlight that the brief “cannot always be stated comprehensively at the outset”. In addition, the problem of sequentially translating requirements into design solutions seems to be a recurring topic in the literature (Smith et al, 1998, Othman et al, 2004; London et al, 2005). Also Smith et al (1998) conclude that structured techniques, although valuable, are limited in nature and cannot replace the designer’s skills and sensitivity in interpreting needs. Accordingly, London et al (2005) describe how architects, working in a different culture, need to utilize not only intellectual capital, but also social capital (socialize with the client) and cultural capital (learn about the culture) in order to gain a deeper insight into the clients requirements. This connects to the complexity and challenge of communication, which is also highlighted by London et al (2005). Finally, the lack of acceptance of structured approaches to briefing as well as the frequent use of drawings may indicate that briefing or programing is traditionally the domain of architects, which often are described as estranged towards ‘management’ (Emmitt, 1999).

Nonetheless, although Kamara et al (2001) are aware of (some of) the above arguments, they cling to the ideal of a clear problem statement – the full understanding that exists somewhere ‘out there’. Accordingly, they recommend a structured rationalistic approach inspired by manufacturing that includes three phases: (1) definition of requirements, (2) analysis (of requirements and priorities) and (3) translation of requirements into design attributes via QFD (which will be described below). Although Kamara et al (2001) also acknowledge that requirements may change over time; they argue that a clear statement of requirements and QFD is, nonetheless, instrumental for mapping and managing these changes.

However, as opposed to the ideal of unambiguous requirements and QFD, Ryd (2004:248) found in a case-study that ‘incomplete’ requirements were difficult to criticize, gave room for innovation and encouraged commitment. Thus Ryd (2008) argued that ambiguous statements of requirements ‘united’ the project participants, because there was room for individual interpretations and sensemaking – in accordance with the actors differing preferences. Indirectly Ryd (2004) states that this resulted in process value, which ultimately had a positive impact on the different parties’ perception of the end-product.

The above discussion connects to Green’s (1996) description of diverging perspectives on briefing. Green (1996) argues that the rationalistic problem-solving perspective,
where objectives are pre-determined, may indeed be valid if the client is ‘unitary’ and positioned within a relative stable business environment. Food-market chains are good examples of such clients. For this type of client, it may even be beneficial to develop a standardized brief. However, if the client is ‘pluralistic’, design should be seen as a “social process based on iteration and learning” (Green, 1996:163). Yet, this reflection is seldom made – people tend to argue about what is the ‘correct’ perspective and use this as a standard template (Green, 1996). Likewise, with reference to DBD, London et al (2005) contest that briefing should be a formulaic process that gradually is ‘refined’ by incorporating the lessons learned from earlier projects – these lessons may not be appropriate for unique projects.

Accordingly, the critiques of briefing seem to revolve around the two main trends (fixed or dynamic brief), and two somewhat opposing perceptions of design: (1) as a problem-solving activity and a merger of (2a) the conversation view of design and (2b) design as a social process. The latter distinction seems to connect to Sebastian’s (2004) second and third categories of design management (the engineering instrumental approach and social-psychological approach). Whereas the problem-solving perspective may be somewhat narrow-minded, the conversation view may lead to uncertainty and consequently inefficiency, since it, if taken to its extreme, entails the abandonment of traditional management (planning and control) techniques. Accordingly, Ryd (2004) poses the question of how to performance-measure a project where the brief is continuously changing.

This discussion is also somewhat reflected in the arguments and critiques of the management concepts that are described below. The first concept, Value management, may be perceived as a structured approach to briefing. It does, however, redirect attention towards the notion of value instead of requirements. Nevertheless, VM tools and methods are often referred to in the literature on briefing.
5.3 Value Management

Value Management (VM) originates from Value Engineering (VE) that is derived from the US manufacturing industry in the late 1940s (Kelly et al, 2007), where World War II had created an urgency to produce products and components (with defined functions) with alternative materials and designs at the lowest costs possible (Zimmerman & Hart, 1982). Specifically, the approach named ‘value analysis’ was conceptualized by an electrical engineer, Lawrence D. Miles, who was employed in the purchasing department of General Electric Company. In the 1950s, after having learned the concept from General Electric Company, the U.S. navy applied the ideas to review engineering ship drawings and value analysis was re-named Value Engineering15 (Zimmerman & Hart, 1982; Snodgrass & Kasi, 1986). Later, in the 1960s, VE spread to the construction industry and was soon adopted in Europe, Australia and Japan and a global development of VE (VM) initiated (Kelly et al, 2007). This sub-chapter provides separate introductions to the related notions of Value-engineering and Value-management, followed by a brief introduction to the central methods and tools. In the end, some critical reflections are provided.

5.3.1 Introduction: Value engineering

According to Zimmerman & Hart (1982:vi) VE in construction developed during the 1960s because: “construction costs were changing faster than estimators could keep track of the fluctuating costs”. In essence, VE aims to creatively assess different alternatives that can provide the required function and quality at a minimum cost (including a life-cycle perspective). As mentioned, VE is based on value analysis which is defined as: “Value analysis is an organized approach to the identification and elimination of unnecessary cost” (Kelly et al, 2007). According to this definition, VE is about cost-cutting and consistent with this view; VE is often conducted retrospectively when project costs have gone over budget (Zimmerman & Hart, 1982; Green, 1994). The underlying assumption of Value Engineering is that value is enhanced by reducing costs or providing more functions for the same or lower costs (Kelly, 2007). According to Green (1994), it is also assumes that ‘functions’ can be objectively defined. In connection to this, Kelly et al (2007:31) describes VE as an approach to enhance value in the ‘technical project’ (although he also believes it can be used earlier). Green (1994) delimits the usefulness of VE to the assessment of building components in the latter stages of de-

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15 However, Snodgrass & Kasi (1986) point out that the term “value engineering” often has a negative impression because it is associated with engineering design, which to some people mean ‘poor value’. Therefore many practitioners still use the original term ‘Value Analysis’ (Snodgrass & Kasi, 1986)
tailed design. However, a somewhat different perception of VE is presented by Snodgrass & Kasi (1986:1), who states that value analysis to a large extent can be used to facilitate communication and improved understanding between different parties.

The Japanese approach to VE is also different in the sense that it focuses on ‘continuous improvement’ throughout the process (Kelly et al, 2007). It seems that there is a link to Lean, which focuses on elimination of unnecessary costs or “waste” in the entire development and manufacturing process (Morgan & Liker, 2006). As stated by Sobek II et al (1999:67): “Toyota excels at value engineering (VE) and value analysis (VA), yet Toyota engineers say they do not use any of the textbook tools”.

5.3.2 Introduction: Value Management

Similar to the workshop model, VM is about enhancing the designers’ understanding of what the client values. This is to ensure an optimal fit between the design and client needs/values. From a traditional planning and control perspective the objective is to thoroughly investigate and fix client needs at the very outset (in a value-tree) in order to design without interruptions (changes) caused by a flawed problem definition. This is encapsulated in the following quote by Kelly et al (2007:212):

“In a traditionally procured construction project the client value system becomes established through a process of trial and error on the part of the designers. It evolves slowly over time as the design team present and present schemes that reflect their current understanding of the client’s value system. With each iteration the designers take one step closer to full understanding…It is proposed here that the client’s value system is made overt initially in a single operation…”

The same rationality applies to the workshop model (cf. Emmitt et al, 2005:58). However, in a more recent publication, Kelly (2007) reported the findings of a VM case-study where significant changes were made to the client’s initial “value system” as the project progressed. Therefore, Kelly called for more research regarding the “influences” of changes in the client’s value system (something this research also considers in chapter 6.3). Accordingly, some researchers are arguing for a more dynamic, ongoing review process where stated values/needs are re-visited as changes in environment and business opportunities emerge. As stated above, this is specifically the reasoning behind the concept of dynamic briefing (Tilley, 2005; London et al, 2005).

Green (1994) differentiates between VE and VM as respectively “hard-systems thinking” and “soft-systems thinking” where VE strives for an optimum solution (required
function at least costs) VM acknowledges that an optimum solution may not exist, but
the objective is to “develop a common understanding of the design problem, identify
explicitly the design objectives, and synthesize a group consensus about the compara-
tive merits of alternative courses of action” (Green, 1994:51). In line with this, Leung
& Liu states that the primary purpose of value management is “to specify the partici-
pants’ values and goals through the conflict stimulation and conflict resolution pro-
cesses” (Leung and Liu, 2003:18) where conflict refers to both intrapersonal and inter-
personal value conflict. VM seems more proactive than VE in the sense that VM is of-
ten applied from the outset of the project as workshops in the conceptual phase to de-
termine the way ahead, whereas VE, as mentioned earlier, usually is conducted as an
audit on the basis of the conceptual design. Wandahl (2005:52) suggests characterizing
VE as a means to “making the product right” and VM as a means to “making the right
product”. The latest development in VM does however suggest (according to Kelly,
2007), that VM is an all-embracing method that includes VE and can be defined as:

Value management (VM) is a service that maximizes the functional value
of a project by managing its development from concept to use through the
audit of all decisions against a value system determined by the client
(Kelly et al, 2007:31).

In addition, Kelly et al (2007:31) have identified the following key features, which are
common for various definitions within construction VM literature:

- Team orientated
- Makes explicit the client’s value system
- Functionally driven
- Proactive and creative

VM and VE include an array of methods and techniques. Some of them have already
been exemplified with the description of the workshop model, others will be outlined
below.

5.3.3 Methods and tools
Thus, to be more concrete, the original core of value engineering is an intense 40 hour
“job plan”, that goes through the phases of (Kelly et al, 2007):

1. Orientation: what are the project objectives?
2. Information: all relevant project information is gathered
3. Creativity: alternative suggestions are put forward
4. Evaluation: assessment of the feasibility of suggestions
5. Development of initial accepted ideas
6. Presentation of ideas to the client and design team
7. Feedback regarding practical use of ideas.

However, according to Zimmerman & Hart (1982) item 2-6 constitute the original standard ‘job plan’ from which various versions have emerged. Accordingly, Green (1994) refers to these five steps and makes an analogy to similar stages in generic creative problem solving. Thus, VE can be viewed as a formal problem solving approach applied to building (Green, 1994).

The job-plan, which include value analysis/function analysis is quite extensive and is therefore described in detail in appendix 2. The appendix also includes an example taken from one of the case studies. However, the general idea is to list all of the functions of a given product (e.g. a ceiling) and then divide the product into all of its components (wires, ceiling tiles, steel grid etc), assess the cost of each component and ascribe the cost to the various functions of the product (e.g. the cost of a wire in a ceiling may be assigned to the function: “resist gravity”).

When cost have been distributed on functions (in the information phase) the review panel may consider if too much money are spent on functions that have a low priority (e.g. if there is too much money spent on ‘beauty’ or ‘ease of access above ceiling’) and whether alternative components or materials can provide an equal or better performance at a lower cost (priorities have been established in the orientation phase). Thus, based on this ‘mapping’ of cost-to-functions, the design may be ‘optimized’.

Subsequently feasibility-studies and development is conducted before presenting the ideas to the client. Accordingly, function analysis is a way to structure a discussion of the relevance and cost of each specific part of a product in relation to predefined objectives – the client’s value-system.

Accordingly, another central tool, which originates from value analysis, is the notion of a value-system or value-tree (cf. description of the workshop model in chapter 1). The idea is that by making a list of variables that are considered important to the client, the consultants and contractors can gain a better understanding of the product they are to provide (and minimize iteration). The value-tree is seen as a way to make the client’s value-system explicit (Kelly, 2007). In addition, it may help the client to make decisions (Green, 1996b). The different variables can be compared and/or weighted in importance to give a sense of priority. Thus, the value tree can serve as the basis for reviewing design (e.g. through function analysis). Attempts have been made to make a generic set of
variables like the one proposed by Kelly (2007:441) in Figure 5.3.3.1. This value-tree has been established through action research.

![Universal client value system matrix (Kelly, 2007)](image1)

**Figure 5.3.3.1: Universal client value system matrix (Kelly, 2007)**

![Customized value tree (Green, 1994)](image2)

**Figure 5.3.3.2: Customized value tree (Green, 1994)**

In the specific example, represented by figure 5.3.3.1, Capital cost is considered the most important variable, whereas Comfort is the second most important variable. This may work as input to function analysis. Others like Green (1994) argue that the value tree should be developed from scratch in each case in order to truly ‘customize’ the variables (which are not only functions as in function analysis). A universal value-tree
or decision model does not exist (Green, 1996b). An example of this is provided in Figure 5.3.3.2. Here the priorities (in percentage) are assigned to each variable that is ordered hierarchically. Design alternatives may then be rated by their compliance to the value tree. Sensitivity analysis should, however, be performed to assess whether small changes in the assigned priorities will result in a different choice of alternative.

Finally it should be noted that value-management exercises are often conducted in workshops, where key client and stakeholder representatives are present, led by a facilitator/value-manager.

5.3.4 Critical perspectives

In addition to the critique provided by the proponents of soft-systems thinking (social constructivism), authors on value engineering acknowledges some practical issues in relation to implementation: One critical argument is that designers should be able to conceptualize an ‘optimal’ solution without (the expenses of) a VE (review) study. In addition, VE can easily be understood as a critique of the design team (Zimmerman & Hart, 1982; Snodgrass & Kasi, 1986; Kelly et al, 2007). For this reason Kelly et al (2007) suggests to include the design team members in the VE exercise. However, this may result in a defensive attitude and lack of ‘objectivity’ in the VE study-team and thus become a barrier to creative thinking (Zimmerman & Hart, 1982; Kelly et al, 2007). Zimmerman & Hart (1982) rejects this ‘design review’ understanding of VE as a mere misunderstanding and states that VE is a formal and multi-disciplined team approach to remove unnecessary costs, which are build into every design project “regardless of how excellent the design team may be” (Zimmerman & Hart, 1982:5). This is based on the philosophy that everything can be improved – especially when dealing with highly complex projects such as construction projects, which are to be designed within time and budget constraints in an ever-changing environment (Zimmerman & Hart, 1982). This may easily result in lack of information, use of habit-solutions and lack of comparison of competing alternatives etc. Thus, it has more to do with management and the complex ‘nature of designing’ than the capability of the designers. Furthermore, Zimmerman & Hart (1982) argues that it should be recognized that it is easier to conduct a review than to conceptualize. One may notice that this argument contradicts the statement that VE is not a design review. Snodgrass & Kasi (1986) do, however, point out that it is not easy to find the appropriate functions and the outcome will vary with the point of view of the participants. Accordingly, Lawson (2006:122) states that “it is rarely possible to dissect a design solution and map it on to the problem saying which piece of solution solves which piece of problem”. This is an indirect critique of Function Analysis.
5.4 Values-based management

According to Wandahl (2005), Values-based management (VBM) is a fairly new concept in the context of construction project organizations, whereas VBM is a known and recognized management concept in traditional company organizations. Nonetheless, the author found it much more difficult to find literature on VBM than any other subject within this thesis. In addition, most of the literature was written by Danish authors. However, a brief review will be provided below, which follows the overall structure: (1) introduction to the concept, (2) central methods and tools and (3) critical reflections.

As with other emerging management concepts, VBM defines itself in opposition to ‘traditional’ management practices. It is argued that conventional management through rules and regulation (bureaucracy), combined with a reductionist focus on money, has become somewhat obsolete in a modern, social responsible, fast-changing and complex environment (Jensen, 1998; Pruzan, 1998; Beyer, 2006). With specific focus on construction projects, Wandahl (2005) argues that the traditional over-emphasis on systems and structures, combined with peoples ‘natural’ self-centered strive to realize their own needs (inspired by Maslow), has, when faced with complexity, led to a narrow-minded contract mentality and lack of moral (Wandahl, 2005). Accordingly, Beyer (2006) describes how traditional rules and performance measurement systems may incline employees (e.g. in social care institutions) to solely focus on that which gets measured and forget about the underlying intent of the metrics (e.g. the caring part). Likewise, Pruzan (1998:1380) state:

"The more complex the business environment, the greater the number of rules...A logical result of applying ‘more of the same’ will be an increasingly suppressive control system that stifles individual initiative and responsibility"

Instead of trying to regulate everything, VBM aims to establish a stimulating environment and the ‘right’ mindset among employees so they become self-managing. It is argued that VBM may facilitate a more proactive and flexible behavior; instead of waiting to adapt rules, when they do not apply with the situation, or external management intervention on the basis of planning and control feed-back loops, participants become flexible and capable of making the ‘right’ decisions themselves (Wandahl, 2005; Beyer, 2006).

This line of thinking connects to Weick’s argument for the stimulation of ‘loosely coupled systems’ with minimum need for coordination (in Boland & Collopy, 2004). Ac-
Accordingly, Cook (2004) points at the value of ‘symbolic poverty’ that refers to the limitations in the notation in music, which leaves room for improvisation and stimulus of tacit knowledge (in Boland & Collopy, 2004). Thus, by giving up on rigorously (and hopelessly) trying to anticipate and specify the actions of other people, people can find their own ways of interacting if only shared values and goals are established.

**VBM as a another control mechanism**

As indicated above, VBM is believed to be a supplementary and somewhat superior management approach in comparison to traditional planning and control systems. Thus, Wandahl (2005) draws on ‘Neuro Logistic Programming’ which describes personality as comprising five hierarchical layers; where upper levels principally influence lower levels. According to this model, traditional management system and structures only affect behavior at a very low level, while values on the other hand work at much more fundamental (upper) level. This is illustrated in the figure below:

![Logical levels in Neuro Logistic Programming](Wandahl, 2005:77)

**Figure 5.4.1: Logical levels in Neuro Logistic Programming (Wandahl, 2005:77)**

Hence, Wandahl (2005) is rather honest in seeing VBM as supplementary control mechanism that may be instrumental in reaching higher ‘product value’ (utility and exchange value). Thus, in line with the ‘process view’ of design management, a causal link is assumed between a good process – where people comply with the code of conduct – and a good product (Wandahl, 2005). Consequently, if one considers Ouchi’s (1979) framework, which was briefly described in the methodology chapter, VBM can be labeled within the ‘clan control’ category, where control of employee behavior is attained through socialization and shared values.
VBM as a reaction to societal developments

On the other hand, from a more romantic viewpoint, one may emphasize the ethical aspect of VBM (e.g. Pruzan, 1998, Beyer 2006). Thus, without being a critical theorist, it is easy to imagine how steering through regulation, with money (shareholder value) as the only denominator, may have negative consequences for a society as a whole. However, Pruzan (1998) state that VBM should neither be seen as romantic idealism or a disguised control mechanism. VBM is simply good business because of the following arguments (Pruzan, 1998:1381):

A. Traditional power is becoming powerless in democratic societies with flat organisations.
B. Leaders are loosing contact with reality in large, complex organisations.
C. The language of money is to narrow.
D. Stakeholders have a right to be heard – and corporations have social responsibilities.
E. Bright, creative, motivated, responsible and loyal employees seek meaningful work, personal development and harmony between their own and the organisation’s values.
F. It pays off.

The elaborated argument for item A, C, D and E, reveals that Pruzan (1998) is somewhat opposition to Wandahl’s (2005) primary focus on VBM as an instrumental management tool for ‘correcting’ immoral and inefficient stakeholder/employee behavior. Instead, Pruzan (1998) and Beyer (2006) see VBM as a necessary response to the demands of employees and stakeholders (the surrounding society). Employees seek meaningful jobs (not only higher pay) and leaders with earned ‘legitimate’ authority as oppose to hierarchical power (Pruzan, 1998; Beyer, 2006). According to Beyer (2006), meaningful jobs establish the basis for employee commitment and motivation, which will benefit the business. Thus, VBM seems to be greatly inspired by human resource management. In addition, VBM builds on a stakeholder view (Pruzan, 1998), in which it is recognized that if the (ethical) values of different stakeholders are not considered or only seen as a means to shareholder value, upset stakeholders may seriously damage a company’s reputation and ultimately its profit. However, in relation to item F above, Pruzan admits that a causal link between VBM and profit still remains to be proven. Instead he argues that there are in fact good examples of successful companies adopting a more ethical orientation. In addition, there are many examples of companies being damaged from public crucifixion because of unethical behavior. Because of this, the logical argument is that it must pay off in the long run. However, it is emphasized that
VBM should be used together with traditional management systems (Pruzan, 1998, Wandahl, 2005; Beyer, 2006).

Beyer (2006) argues that although VBM builds on well-known leadership principles, it does represent a novel shift from traditional thinking. Thus, VBM is grounded on a new emerging world-view of natural environmental scarcity and chaos theory, as oppose to ongoing evolutionary development, which is the philosophy behind traditional management. In addition, Beyer refers to Giddens’ notion of the post-traditional society and the increased level of reflexivity (as was described in the context chapter). Thus, the new world-view entails a greater level of conscience (traditional values have eroded and scarcity necessitates it) and flexibility (because of the ‘chaotic’ environment). In addition, the notion of value-chains and the growth of net-work organizations entail a shift from sub-optimization to broader consideration of the well-being of other companies (Beyer, 2006). To make the many interfaces work, including customer relationships, trust has to be established, which according to Beyer (2006) necessitates leadership based on values (as opposed to narrow focus on profit).

**VBM as a means to holistic leadership**

Beyer (2006) uses a distinction between a mechanic and a gardener to describe the shift in leadership style; the latter refers to values-based management and the former refers to traditional management. Thus, values-based management is about nurturing employee development and self-management as oppose to telling them what to do and ‘fix’ problems. It is argued that organizational learning, development and flexibility necessitates tolerance of diversity, which nonetheless can be tied together with values to ensure cohesion (Beyer, 2006). On the other hand, Beyer argues that by working with (questioning) the ‘mental models’ and the identity of an organization, it is possible to open up to more fundamental learning (not just adaptive learning) and ability to change. Thus, Beyer seems to be inspired by Argyris and Schön’s notion of double-loop learning (see chapter on design theory).

Anderson (1997) argues that VBM can be used to guide more holistic (management) decision-making, when faced with dilemmas. Thus, according to Anderson, managers are continuously faced with ‘value dilemmas’ that revolve around the following four competing goals: Economic Performance, Competence (assets for competitive advantage e.g. systems and people), The Learning Organization (ability to learn and improve) and The Organization as a Community (the glue/buffer that makes the institutional structures work via trust and commitment). Again it is argued that narrow emphasis on short term economic performance will result in bad decision-making and employee indifference. Instead of relying on the philosophy of market forces and profit, other perspectives are suggested that include stakeholder analysis (consider stakeholder saliency), ‘the reasonable man argument’ (seek compromises between extremes), combined
with elaborate consideration of six values-categories\textsuperscript{16}. It is argued that a structured reflection, on these perspectives and values, may foster better long-term decisions that create synergy between goals (instead of trade-offs).

Likewise, Beyer (2006) emphasizes the importance of a leader’s ability of making choices about ‘ethical’ problems. However, before ending up with the same recommendation as Anderson, Beyer (2006) provides a somewhat different argument; Beyer (2006:48) suggest that many decisions are unconsciously based on values and intuition – arguments are constructed subsequently – and by clarifying these underlying values and feelings, the decision-making process becomes more predictable and well-reasoned. In general, the term ‘holistic’ seems to be a central term in VBM.

Pruzan (1998), Beyer (2006) and Anderson (1997) all place great emphasis on ‘improving’ management behavior, which is somewhat in opposition to Wandahl (2005), who is more concerned with correcting stakeholder and employee behavior (although this requires improved management). However, Wandahl’s (2005) perspective is likely to be a result of context; Wandahl focuses on (temporary) construction project network organizations, where contractors’ and craftsmen’s inclination towards sub-optimization and cost-focus is a common story-line. Instead, Pruzan, Beyer and Anderson focus on traditional organizations, where management executives’ sole focus on shareholder value and profit has been criticized.

\textbf{5.4.1 Methods and tools}

Nonetheless the establishment of organizational values-statements seems to be a common feature in VBM. Thus, in order to steer by values in construction, Wandahl (2005) suggests facilitated workshops in which project participants jointly agree on a values-system. Although it is recognized that people have different values, the goal is to agree on a set of values which, as a minimum, does not conflict with any of the project participants’ values-systems. Next, behavior can be monitored (see Figure 5.4.1.1 below) through self-reporting systems, in which project participants anonymously and continuously are asked to report (1) the significance they assign to each of the values and (2) to what extent they believe that the project organization is complying with the values (Wandahl, 2005). This then provides the data for potential interventions.

\textsuperscript{16} Anderson (1997) identified the following values as the most common values in company values-statements: (1) General beneficence (what the organization does that will make a contribution to society beyond profit), (2) Justice, honesty, and fairness (3) Mercy or compassion (e.g. towards employees with problems or disadvantaged groups) (4) Frugality or economic efficiency (5) Humility (to increase sensitivity and avoid arrogance) (6) Individual dignity (mostly a western value).
It is believed that emphasis on steady development of values-congruity among project participants, will furnish a common frame of mind among project participants, which will lead to improved communication and collaboration and, eventually, a higher ‘product-value’ (Wandahl, 2005). Accordingly, VBM draws on group dynamics theory, in which it is recognized that the establishment of group norms speeds up communication.

![Figure 5.4.1.1: Aggregated data of values compliance (Wandahl, 2005:82)](image)

To facilitate the establishment of organizational values in construction, the VALiD research programme also suggests an employee focused ‘bottom up’ method, as oppose to the more wide-spread practice of imposing top-management values on to the organization (Mills et al, 2009). This is also in line with Pruzan’s (1998) recommendations. More concretely, the VALiD approach utilizes Schwartz Value Survey in which all members anonymously rate the 56 value-items via questionnaires. The collective result is shown to the group and each member can compare the result to their individual score. Although it may be used for the establishment of organizational values, Mills et al (2009) argue that the result of the SVS is valid in itself as a basis (a catalyst) for informed debate and understanding of values among members in an organization. Thus, research suggests that employees who are aware of their own values are more likely to be committed to their job (Mills et al, 2009). Subsequently to the discussion and creation of a joint values-system, ‘appropriate’ performance measurements (in relation to behavior) can be established (Mills et al, 2009). The underlying idea is that misalignment between organizational values-statements, incentive structures and the values of its individual members will be de-motivating, whereas alignment between these three elements may be motivating. Accordingly, Figure 5.4.1.2 is adopted from Mills et al (2009), which show Schwartz’s ‘universal’ values system in a slightly adapted version. Here it has been used as a spider-web diagram to compare values-priorities among directors and other staff in an organization (Benevolence has been labeled as “Others oriented”).
Beyer (2006) suggests establishing and displaying (1) organizational values in close connection with the preferred (2) identity of the organization (denoted as ‘mantra’) and concrete intentions for everyday (3) behavior. Regarding behavior, Beyer notes that oftentimes this is where the discussion really becomes difficult. Thus most people do not disagree with overall values-statements because they are always so positive. However, dilemmas are likely to arise when discussing actually behavior e.g. if the client is ‘god’, should I then recommend another company if they are more competent for solving the specific task? Furthermore, these three items should be developed with concurrent focus on the (4) overall mission, (5) strategy and (6) action plan (tactics) of the organization. Together these six elements should be displayed on a poster that is denoted the ‘playing field’. Thus, Beyer (2006) emphasizes the need to bridge values and the more concrete and rational goals of the organization. Beyer (2006) suggests a process of: Definition – an introduction to VBM, Discovery – organizational analysis to establish a picture of the current organization, Dream Design – a seminar for sharing and development of common values followed by management group self-evaluation and more concrete consideration of intentions for behavior and ‘tactics’. This is followed by a Destiny phase for dialog, establishment of commitment and ongoing coaching.

Figure 5.4.1.2: Schwartz’s universal values structure used to compare differences in values-priorities (Mills et al 2009:489)
The inclusion of the latter phase indicates that a values-based organization is not established by agreeing on common values and monitoring. Beyer (2006) and Wandahl (2005) stress that the leaders need to constantly nurture the environment and ‘walk the talk’. To encourage self-management is not an excuse for passiveness among leaders (Beyer, 2006). Leaders should create a sense of meaning; not only by distributing information, but through dialog and dedicated ‘story-telling’ (sensegiving), which can foster commitment and motivated action (Beyer, 2006). As a supplement to the mechanic and gardener distinction, Beyer (2006) refers to the more well-established distinction between management and leadership; the latter is about creating motivation and ‘life’, whereas the former is about administration and structures. Thus, in spite of the ‘management’ term in Values-based management, it actually places emphasis on leadership. The central themes are motivation, trust, empowerment and dynamic strategic thinking (as opposed to planning). Accordingly, the unpredictability of the environment is emphasized (chaos theory) which entails continuous change/adaption of strategies as new opportunities arise. It is argued that these short term strategies can be anchored and guided by intuition and values combined with a few simple key-success factors and overall goals as opposed to complicated surveys and analyses (Beyer, 2006). Doubt and explorations should be encouraged as a means to creativity and innovation as opposed to certainty and self-complacency, which may lead to groupthink. However, for the sake of delimitation, this will not be treated any further.

5.4.2 Critical perspectives

Some problems are also recognized by the proponents of VBM. Thus, Wandahl (2005) describes the use of power as a potential barrier to VBM and furthermore points at the challenge of implementing VBM in short-term project organizations with shifting participants. Pruzan (1998) highlights the challenge of managing the interest of all stakeholders while simultaneously trying to keep focused. In addition, Anderson (1997) warns against the potentially counter-productive effects that may arise if companies do not live up to their values-statement. Then values-statements will become de-motivating and targets for public attack. Without comprehensive nurturing and follow-up, the values-statements often become hollow (Beyer, 2006). Finally, Beyer (2006) acknowledges that some employees do not desire more ‘freedom’ to self-manage – they like the comfort of clear rules and procedures. However, according to Beyer, appreciation of freedom to self-manage is something that can be learned gradually. Finally, one may note that the VBM proponents collectively neglect the research publications that question the assumed link between values and behavior (see chapter on value theory).
Lean Product Development

Lean Product Development is the newest extensions to the broad concept of lean. In short, the term ‘lean’ was coined by American researchers at MIT who in the 1980’ies were investigating the apparent success of the Japanese automotive industry (Holweg, 2006). Subsequently the notion of lean production became world famous, when Womack et al (1990) popularized the findings. Especially the Toyota production system (TPS) became the object of attention and TPS is often used interchangeably with lean. However, Toyota automotive history dates back to the late 1930ies. Because of the war and the post-war financial situation in Japan, the automotive industry was struggling and therefore Toyota had to learn to produce in small batches without large inventories or wasteful activities (Holweg, 2007). However, inspired by (US) mass production and supermarket logistics, innovative Toyota engineers eventually refined the production system into a ‘hybrid’ that combined the benefits of mass production (economy of scale) with low inventories and a large variety of products. Cross utilization of standardized components, fast change-over times of machinery and ‘just-in-time’ logistics became key-features of the “Toyota way”. Today Toyota develops more new cars annually with higher quality, at lower cost and with a higher profit than most of its competitors (Morgan & Liker, 2006a) and, with the recession; it has become the biggest car manufacturing company in the world.

Lean Product Development (LPD) – a conceptualization of the Toyota Product Development System (TPDS) – is, however, a relatively new area of research compared to the massive coverage of Lean production (Haque and James-Moore, 2004; Baines et al, 2006; Morgan & Liker, 2006b; Ballard et al, 2007). Thus, the TPDS encompasses methods and techniques that are distinctively different from those associated with Lean Production (although they go together and there are many similarities). These will be described below, after a more general discussion of the concept.

As stated earlier, the relevance of the chapter is twofold: (1) to show familiarity with a concept that by some scholars is considered to be state-of-the-art in design management and (2) to provide background knowledge of the management tools that have been extensively used in one of the case-studies.

5.5.1 Introduction: General considerations

It is often emphasized, that lean product development is a system, a coherent whole, not application of techniques, and achieving ‘leaness’ is not a state but a continuous journey (Liker et al, 1996; Karlsson and Åhlström, 1996; Sobek II et al, 1999; Ballé & Ballé,
Thus, Morgan & Liker (2006a) describes the TPDS in a framework of (1) process, (2) people and (3) tools and technologies, which is subdivided into 13 principles as an attempt to describe the system. An efficient process cannot stand alone without skillful people, who are supported by useful tools and technologies. However, in the literature-reviews performed by Haque and James-Moore (2004) and Baines et al (2006), LPD is mostly described as an array of principles and techniques, which should be “integrated” and sometimes guidance is provided on how to order the principles in a practical sequence of application. On the other hand, according to Baines et al (2006), there is a discrepancy between western manufacturers, who often defines lean through the application of certain tools and techniques, and their Japanese counterparts, who speaks more of a certain culture. Accordingly, Liker (2004) argues that this is the key difference between Toyota and western companies, who struggle to become lean. In his famous book, The Toyota Way, Liker (2004) suggests the framework of the 4P’s represented in the pyramid in figure 5.5.1.1:

Within this structure, Liker (2004) argues that most companies are only addressing the “process part” of the system (aka operations management). As opposed to mass production, where focus is limited towards the efficiency or utilization of each machine or department (assuming that this will optimize the whole) and large batches (inventories) are used to work around misalignment of operations (and quality problems), the “lean” companies focus on the process as a whole; aiming to make the product (or piece of information) “flow” by sequencing and leveling all steps in the process from the view of
the product itself (single-piece flow) with the ideal of producing (1) exactly what the customer needs (2) immediately when they (or the next sub-process) needs it and (3) without (or alternatively minimizing) any non-value adding activities (waiting in inventory, rework, unnecessary moving etc).

However, apart from the tangible lean methods, such as mapping the process (value stream mapping), ‘pull’\textsuperscript{17}, ‘kanban’\textsuperscript{18}, visual control etc., which makes this possible, Liker argues, that the true advantage of Toyota lies within its culture (Liker 2004:35), which builds on long-term thinking and a unique approach to problem solving and leading “people and partners” towards continues improvement (‘Kaizen’). Thus, after telling a story of the Toyoda family, who started as ‘simple people’ with an altruistic strive for contributing to society, Liker (2004) compares Toyota to the downfall of ‘cynical’ capitalism enterprises and states that “the Toyota Way provides an alternative model of what happens when you align almost 250.000 people to a common purpose that is bigger than making money” (Liker, 2004:72). This illustrates an almost religious touch to the lean ‘movement’ (other examples are provided in Liker, 2004). Also, the similarity to Values-based management is evident

Likewise, teaming up with Morgan (in Morgan & Liker; 2006b), the term “cultural transformation” is linked to Deming’s (or Shewhart’s) Plan-Do-Check-Act learning cycle that, according to Morgan & Liker (2006b), can express the approach through which Toyota has become a “humble, learning organization”. In addition, the CII Research Team 234 (Ballard et al, 2007) concludes that “it [lean] is now widely recognized as a fundamental business philosophy” (Ballard et al, 2007:2).

Even so, the reason for the opposing (and frequent) emphasis on tools and techniques may very well be that the Japanese (Toyota) approach, which has been termed “lean”, has been developed by practitioners and is mostly of interest to practitioners and management consultants, who prefer tangible tools and techniques. Accordingly (Ballard et al, 2007:3) state that theory development has lagged behind the (perceived) innovations in practice. Especially when considering LPD, it seems that no commonly accepted overall conceptualization has emerged except for consensus about certain techniques and principles such as set-based concurrent engineering, just-in-time pull of information etc. with the overall purpose of eliminating waste and enhancing customer value. Therefore, the following section is also confined to only describing principles and techniques. Accordingly, the review may seem a bit fragmented, because it lacks an overall frame-

\textsuperscript{17}‘Pull’ means that each sub-process only produces something when it is requested (via kanban) from the subsequent process (triggered by a down-stream customer demand), as opposed to producing on forecasts and trying to ‘push’ components or products forward in the assembly line to the customers (which often results in inventory) (e.g. Liker, 2004:105).

\textsuperscript{18}An indicator and description that signals a request for more of a specific item (e.g. Liker, 2004:107)
work, but this may actually be a suitable representation of LPD. The review is, however, ordered in three overall themes:

1. Customer value and policy deployment
2. Functional integration and process flow
3. Learning and improvement

Customer value and policy deployment is about understanding and aligning the whole organization towards customer value as an essential parameter for competitiveness; thus making sure that the “right” thing is produced (similar to value management). Item two, integration and process flow, is about efficiency especially by addressing the multiplicity of functional expertise and interdependency inherent in product development. The learning and improvement theme is about constantly improving both product and processes to increase customer value and reduce costs (waste). So arguably one might also boil the three categories down to the usual lean saying “increase value and reduce waste”, but this seems too indefinite and ambiguous in the author’s view. The categorization, which has been chosen, is however also misleading in the sense that most of the principles described below cannot be confined to only one of the three themes. For instance, standardization can be a means to integrate and streamline PD processes (Theme 2) as well as be the basis for learning and improvement (Theme 3).

5.5.2 Methods and tools

Customer value and policy deployment

At Toyota it all starts with the customer (Ballé & Ballé, 2005; Morgan & Liker, 2006b). However, because of the scale of car manufacturing, the customer can obviously not be included within the development process in the same way as in construction. At Toyota experienced technical experts, the Chief Engineers (CEs), are responsible for delivering ‘customer value’ and leads the development programs from concept to marked (Ballé & Ballé, 2005; Morgan & Liker, 2006). The CE and his (they are usually men) staff will not only conduct market research, but also try to experience the ‘real’ needs of the customer. For example, prior to the development of the RAW4 model, the CE moved in with a young American family, that represented the targeted customer group (Morgan & Liker, 2006a).

On the basis of several months of information gathering, analysis and discussion regarding customer needs the CE forms a ‘concept paper’ that is approved by the managing directors and is considered to be the law of the development program (Ballé & Ballé, 2005; Morgan & Liker, 2006a). The document, that seldom exceeds 25 pages, describes
the ‘vision’ for the new product and it is decomposed in specific objectives for each functional team within the program to form a ‘value hierarchy’ that aligns the work of all functions (Morgan & Liker, 2006a). This can be described as strategic management, where emphasis is on performance objectives rather than detailed specifications (Karlsson and Åhlström, 1996). Subsequently cross functional module development teams (MDTs) formulates specific goals for each subsystem of the car and the goals are negotiated with the CE on the basis of the concept paper, thus leaving room for some ‘lower level’ influence to achieve consensus and commitment (Morgan & Liker, 2006a). Next, strategies for achieving the goals are developed and an intensive study period (the ‘Kentou process’) begins where competitor products, production quality data and process efficiency is examined while exploring multiple design alternatives simultaneously in close cooperation with suppliers (Morgan & Liker, 2006a). Hence, a lot of resources are spent in the early design phase, which is referred to as frontloading (e.g. Morgan & Liker, 2006a). The purpose of ‘frontloading’ is partly to increase customer value, but similar to value-management the aim is also to make the conceptual solution more ‘robust’, in order to reduce wasteful iterations in the subsequent phases, where changes become more expensive (Liker, 1996; Morgan & Liker, 2006a).

Regarding customer value, it should also be mentioned, that Toyota apparently succeeds in teaching employees the “customers first” slogan and typical conflicts between stylists, design- and production engineers are overruled by the policy of delivering customer value (Ballé & Ballé, 2005; Morgan & Liker, 2006b). Thus, it is assumed that customer value can be clearly defined. The early stages of the development process are also outlined in appendix 1 (concerning process models). In the following, LPD principles for aiding process flow and product compatibility are outlined.

**Functional integration and process flow**

To maintain functional expert knowledge Toyota is organized in conventional functional divisions, but utilizes the MDTs to integrate sub-systems and the CE teams acts as overall system integrators with product focus across all divisions (Morgan & Liker, 2006a). However, as the departments and divisions have increased in numbers, Toyota has within recent years reorganized and grouped product families in platform centers, thus delimiting the scope for each CE team and functional division and focusing the utilization of common platforms and components for related products (Ballé & Ballé, 2005). However, this kind of matrix organization can easily result in a struggle between product and divisional focus. There is also a risk of a “chimney effect” with great barriers between functional experts in the same way as in construction, where architects and engineers sometimes quarrel over technical and aesthetics trade-offs. Likewise, it often occurs that construction-professionals work on more than one project, without
complete devotion to any specific project. However, according to Morgan & Liker (2006a) Toyota succeeds because of the customer first mentality and the functional manager’s recognition of the importance of cross-functional cooperation. Accordingly, the senior engineers and functional managers who have spent many years of training in one functional division (at least 10 years) go on job-rotation in order to broaden their horizon (Sobek II et al, 1998). Also the status of the CEs, who are characterized as “heavy-weight project managers”, which are highly revered among employees, seems to play an important role, although they have no formal authority over functional personal (Womack et al 1990; Sobek II et al, 1998; Liker, 2004; Ballé & Ballé, 2005; Morgan & Liker, 2006a, Baines et al, 2006). The approach has been described as functional integration as opposed to functional coordination, seeing integration as a team approach where functional experts meet and work face to face instead of having their tasks coordinated by management (Karlsson and Åhlström, 1996).

**Concurrent engineering and set-based design** can also be seen as means to integrate functional expertise. Before concurrent engineering became widespread, western car manufacturers developed cars in sequential phases of styling, system design, component design and manufacturing engineering etc. In line with this paradigm, a point-based design approach was prevalent and is still, by some authors, considered to be a key reason for western car manufactures lacking behind Toyota (e.g. Liker et al, 1996, Morgan & Liker, 2006b). In point-based design, different alternatives are quickly narrowed down and a single solution is handed over to the next specialist, who separately can consider different alternatives within her area of expertise, but then either decides on a single solution that is compatible with the product or, if this is not possible, asks for some changes to be made to the original design. In this way the product evolves through feed-back loops and iteration. However, a disadvantage in point-based design is that changes, from downstream functions, often emerge after upstream functions have committed to a particular solution (Sobek II et al, 1999). If a change to the original design for some reason needs to be accepted, it may have incalculable consequences and the process may go on without converging until there is no more time (Sobek II et al, 1999).

Cross-functional teams can be a means to accommodate this problem, but according to Liker et al (1996) the benefits of concurrent engineering will not be fully exploited unless a truly set-based approach is adopted. Also, a disadvantage of cross-functional teams is that they may over time loose some of their functional expertise, because everybody becomes generalists as opposed to specialists (Sobek II et al, 1998).

At Toyota styling, engineering and manufacturing solutions (including supplier components) are co-developed and multiple alternatives (a set) are considered simultaneously by all parties with a high degree of overlap (Ballé & Ballé, 2005; Morgan & Liker,
Hence, the product solution is developed through convergence of alternatives in different functional divisions by narrowing down inferior design options (Liker et al, 1996). In this process, system compatibility is given a higher priority than fast completion of individual components (Morgan & Liker, 2006a).

Liker et al (1996) exemplifies the difference between point-based design and set-based design with the situation of booking a meeting between busy colleagues. If the head of the meeting adopts a point-based approach, she will only suggest one option and, if it does not fit with one or more of the participants’ calendar, a new suggestion is made – in this way many feedback loops can take place. In the set-based approach each participant gives a range of possibilities and the meeting is held where coincidence is found (Liker et al, 1996).

After having explored different options, intersections between feasible alternatives are found and decisions are made by means of trade-off curves and quality matrices (Sobek II et al, 1999). Thus, Toyota (aim to) avoid making decisions on best-guesses and tacit experience, but uses explicit quantifiable data in every decision possible (Sobek II et al, 1999).

Another underlying principle (or consequence) of the set-based concurrent engineering approach is to work with minimum constraints or “black-box” requirements, where functional divisions or suppliers design to performance targets – not detailed specifications (Sobek II et al, 1999). This implicates that prototype solutions – which have been developed from limited information – can become the point of reference, even though they may differ slightly from detailed drawings; thus solutions emerge through interaction between specifications (targets) and as-build refinement (Liker et al, 1996; Sobek II et al, 1999). However, it is important that the separate development work in each functional division stays within the specified range and set of possibilities to insure integration (Sobek II et al, 1999).

Accordingly, the set-based approach needs to be executed with caution and experience – taking a long time to make decisions does not automatically improve the product or process (Liker et al, 1996; Morgan & Liker, 2006b). In concurrent engineering, employees and suppliers need to be able to cope with uncertainty and work with few specifications, which only describe the main idea and maybe some outer limits or performance criteria (Liker et al, 1996). Accordingly, Toyota has a differentiated approach towards suppliers based on whether the suppliers are capable of working in a set-based way or not (Liker et al, 1996). Thus, Liker et al (1996) found that a set-based supplier approach seems to correlate with years of early involvement in the PD process. Finally, it makes more sense to use a set-based approach where interdependency in design sub-
systems is high and trade-offs need to be considered. Accordingly, if parts of the design can be “isolated” without having an effect on other parts, it is more reasonable to provide a single best solution for each part separately (Liker et al, 1996).

Efficiency at Toyota is also achieved by means of arranging information from one function to the other, prioritizing what needs to be worked on now and later and letting engineers pull the information as needed – not overburdening them with huge amounts of data as soon as data are produced (Morgan & Liker, 2006a). The philosophy of ‘pull’ and just-in-time is applied to information management in LPD (Haque and James-Moore, 2004, Browning, 2000). Also face-to-face communication to achieve integration is an important feature of a LPD (Karlsson and Åhlström, 1996). However, the research of Sobek II et al (1998) suggests that the amount of face-to-face meeting time is restricted to a necessary minimum; if an issue arises the first thing to do is to write a concise report that presents the problem diagnosis, key information and recommendations often on a single sheet of A3 sized paper. This can be accompanied by a very short meeting or a phone call. If the problem cannot be resolved in one or two feed-back loops it is time to call for a meeting (Sobek et al, 1998). To make meetings effective, Toyota engineers do comprehensive preparations prior to each meeting; setting up the grounds for decision making by briefing the decision makers informally and preparing the A3 reports that in a standardized form communicates the critical essentials and status of different solutions in development (Sobek et al, 1998, Morgan & Liker, 2006). In addition functional managers including designers, manufacturing engineers and purchasers frequently meet in project meeting rooms called “obeyas” or “big room”, where visual A3 reports, schedules and charts are posted, to strengthen communication and develop team atmosphere (Ballé & Ballé, 2005; Morgan & Liker, 2006a).

To ensure quality and speed in the process Toyota also utilizes a comprehensive standardization system in which processes, engineering skills and design solutions are standardized (Sobek et al, 1998; Haque and James-Moore, 2004; Morgan & Liker, 2006a). However, one may point out that applying process and design standardization is no innovation in management. On the other hand is seems unusual to standardize the skills of highly educated engineers. The espoused benefit is a more flexible workforce, where engineers can shift between programs and thereby “level” (Heijunka) the workload (Liker, 2004; Morgan & Liker, 2006a). Also, employees know what they can expect from each other, which means that less meeting-time and interaction is necessary (Sobek et al, 1998). The product and process standardization further contributes to enhancing overall process efficiency, but also forms the platform for learning and improvement (Morgan & Liker, 2006a).
Learning and improvement

At Toyota all new solutions must ‘prove themselves’ against the standardized solutions (Morgan & Liker, 2006a). This does not necessarily restrict creative ideas, because ambitious goals need to be reached in order to achieve the vision in the concept paper and, as mentioned earlier, it is not acceptable to present one single solution to a given task (point-based design) – the engineers and designers must present several potential solutions to demonstrate that they have explored the ‘design space’ (Morgan & Liker, 2006a). Thus, set-based design not only aims to create efficiency in coordination, but also stimulates creativity and quality in solutions via considering more than one alternative (exploring the design space). If a new product or process solution is more successful than the standard solution, it becomes the new standard. In this way standards provide the stepping-stone for continuous improvement and organizational learning (Sobek II et al 1998). This practice is reinforced by Toyotas short development cycles, which prevents standards from gathering dust and becoming too obsolete to employ (Sobek II et al, 1998). In practical life, standardization is mostly done by means of simple check lists developed and “owned” by the designers, who are responsible to keep them up to date within their area of expertise and pass them on to new employees (Sobek et al, 1998; Morgan & Liker, 2006b). Standards can easily evolve to cumbersome bureaucracy, but according to Sobek II et al (1998) standards work well at Toyota because they are simple in format and maintained by those who use them.

Another principle, that is often emphasized, is ‘going to the source’ (‘Genchi genbustsu engineering’) where engineers uses a hands-on approach to observe the manufacturing process, participate in prototype building and working with integrated suppliers to get a first hand impression of the challenges in product development (Liker, 2004; Ballé & Ballé, 2005; Morgan & Liker, 2006a). This connects to the learning culture in Toyota, where profound technical competences are highly valued and developed through an extensive educational and mentoring program as well as procedures for reflection, ‘Hansei’, to achieve continuous improvement (‘Kaizen’) (Ballé & Ballé, 2005; Morgan & Liker, 2006a). Also, the way in which Toyota has organized itself in highly specialized functional divisions, where engineers usually spend most of their careers, is a way to build expert knowledge (Sobek et al, 1998). Furthermore as mentioned in the introduction, Morgan & Liker (2006b) argues that a key reason for the success of Toyota is its employees’ ability to try out new things and to apply the plan-do-check-act learning cycle in every detail of work. Therefore any description of Toyotas techniques and methods will always be inadequate in the sense that they are constantly changing (Ballard et al, 2007).

As an example, Liker (2004:47) describes how a chief engineer set six "no-compromise” goals for the first Lexus, which initially seemed impossible to achieve.
5.5.3 Critical perspectives

Lean has been criticized for being ‘mean’ as cultural differences arose, when lean principles were transferred outside Japanese boarders. Accordingly, Morgan & Liker (2006b) describe how American employees opposed Japanese management, after the workers had been subjected to relentless critique for some time. The Japanese management only saw this as a means for continuous improvement – they did not understand how praise could improve the product or process (Morgan & Liker, 2006b). It has also been argued (at least when focusing on production) that a high-pace non-buffered, just-in-time production system combined with long Japanese working-hours can be extremely stressful and lead to resistance (Jørgensen, 2006; Morgan & Liker, 2006b). Accordingly, in relation to the Prius development program, Liker (2004:59) describes how “Toyota engineers worked slavishly, canceling all vacation, to engineer the body...everyone understood they had to make personal sacrifices to work on this project that was so visibly important to the company and had such aggressive goals and timing targets”. However, adherence to company policies and customer value may be harder to achieve in more individualistic orientated western cultures. Nonetheless, Japanese transplant operations in the U.S. and U.K have shown that Toyota can achieve superior manufacturing performance in western countries as well, indicating that lean is not culturally bound (Holweg, 2007). The question is at what price.

Regarding culture, one may add that the nearly life-time employment policy in Japan is more stimulating for investment in employee training, mentoring and socialization (Sobek II et al, 1998), than western culture, where “big careers” seldom are accomplished through loyalty to one company.

Regarding documentation, one may notice that descriptions of LPD are mostly provided by four researchers (Sobek II, Liker, Ward and Morgan), who draw on each other’s work quite heavily without much attention to research methodology or critical reasoning.

This critique aligns with the findings of Jørgensen (2006:96-98) who, based on a broader review of lean production literature, found the following main points of criticism (presented here in a condensed form):

- The basic [low] quality and reliability of popular literature that has dominated the broader debate on ‘lean production’
- The utmost importance of [e.g. Japanese] context and its decisive role has been widely ignored
The implicit assumption that elimination of waste an enhancement of value is the most advantageous strategy for achieving competitiveness and profitability cannot be generalized.

The application of ‘lean production’ in Japan and in the West has caused significant negative side effects that have been documented in a number of studies. Especially research into working conditions and other HR aspects has revealed negative side effects resulting from practices of lean production.

Finally, one could argue that the creativity in styling suffers on the behalf of engineering concerns. Aesthetic quality is subjective, but in the author’s opinion it is seldom that Toyota produces a car, which is very good looking. Accordingly, Sobek II et al (1998) describes how a styling detail, which aimed to create a more exciting look on the Celica sports car, was disapproved and changed by a functional manager because of the expected difficulties it would create in production. Yet, in the article by Sobek II et al (1998) the modification was viewed as an innovative compromise. In addition, the incremental development strategy based on standards may prevent big leaps in thinking (Sobek II et al, 1998). However, as mentioned earlier, this may be counteracted by another lean principle, which is visionary target setting (in the concept paper) – something which is also referred to as target costing (when lowering costs is the main objective). Accordingly, Liker (2004) and Morgan & Liker (2006a) oppose this critique by reference to the Toyota Prius hybrid car, which can be viewed as a very innovative development because of its combination of an electronic motor and a traditional internal combustion engine. This was developed by reason of visionary goals set by Toyota management (Liker, 2004; Morgan & Liker, 2006a). Still it seems mostly to be an achievement in application of technical knowledge – not in styling.

In relation to (one-off) construction projects, the fact that development expenses at Toyota can be distributed on millions of cars makes it more feasible to “frontload”. Also, the data generated from exploring multiple alternatives can be seen as an investment, which may be incorporated in the next project or pays off indirectly through expanded skills and learning (Sobek II et al, 1999). However, since construction projects are often carried through by one-off multi-organizations, the companies need to agree on a set-based approach without being able to truly benefit from the joint investment in future projects. Alternatively, the client or/and the companies may invest more resources in the early stages of a project, based on the belief that it will pay off through higher product quality and less iteration in the downstream stages. However, the lowest-bid industry paradigm may well be a serious barrier for this to flourish. A way forward may be off-site manufacturing. Another way forward may be the adapted version of lean, Lean construction, which will be described below.
5.6 Lean Construction Design

As in manufacturing lean product development or ‘Lean Design’ has received little attention in the construction industry compared to research and application of lean in site production (Jørgensen, 2006). In addition, as noted earlier, there seems to be a skewed focus towards flow management and waste reduction as opposed to managing and enhancing value creation (Jørgensen, 2006). Accordingly, techniques such as the Design Structure Matrix (DSM) and the Last Planner system of Production Control for coordination and scheduling of design tasks have been promoted in several publications (e.g. Houvila et al, 1997b, Koskela et al 1997, Hammond et al, 2000, Koskela et al, 2002). Also, the use of process protocols (Formoso et al, 1998; Tzortzopoulos & Formoso, 1999) and value stream mapping\(^20\) (Freire & Alarcón, 2002) has been suggested as means for increased efficiency in the design phase. However, there appears to be an increasing interest in the ‘value creation perspective’ and some propositions of applying QFD (e.g. Houvila et al, 1997a; Koskela et al 2002; Lima et al, 2008), target costing (Ballard, 2006, 2008) and set-based design (e.g. Ballard, 2000; Parrish et al, 2008) can be viewed as developments in this respect, together with the work of (Emmitt et al, 2004, 2005), which include the initial development of the workshop model.

\(^{20}\) Value stream mapping (VSM) is basically a mapping of existing processes and subsequent identification of wasteful activities (moving, waiting etc) and accordingly a reconfiguration of the (design) process via a process protocol. Application is however most suitable to recurring/observable practices (which can be mapped) within for example a design company.
In accordance with this newly focus and experimenting with ‘lean’ tools in the early stages of construction projects, Ballard (2008) found it appropriate to ‘update’ the first phases (Project definition, Lean design) of the Lean Project Development System (LPDS), which is represented by a prescriptive phase-model (see figure 5.6.1). These phases seem to correspond\(^{21}\) to the pre-project, conceptual design and design development phases of the overall process model described in chapter 3.2. Emphasis in the following will be on ‘value oriented’ tools in these phases, whereas ‘flow oriented’ methods such as the DSM and LPS are only briefly described. Since the underlying ‘theory’ of Lean construction has been somewhat described in the introduction to management concepts (the TFV theory of production), the following section is confined to describing ‘Methods and tools’.

### 5.6.1 Methods and tools

**Relational contracting**

Usual construction contract agreements mostly give incentive to look out for one self. Contrary to this, ‘relational contracting’ aims to align the interests of the various parties to promote collaboration (Ballard et al, 2007). This means shared risk and reward and increased focus on partnership and trust between project participants (Ballard et al, 2007). In order to look at the project as “a whole”, this also entails the sharing of financial information between project participants. Thus, relational contracting seems to be closely related to the notion of Partnering (See Gottlieb, 2010).

**Target Costing**

Target costing was briefly mentioned in the previous chapter. Essentially, Target Costing is about qualifying a target cost, which is set lower than expected best-practice costs in order to stimulate innovation (create new best-practice). Thus, the idea is that visionary goals can create a sense of necessity for change and (artificial) cost constraints can help reveal wasteful practices. Accordingly, citing Taiichi Ohno, former Vice President of Toyota, this is often referred to as “lower the river to reveal the rocks” (Ballard et al, 2007:13), where the amount of water is to be understood as the financial or capacity buffer, which makes it too easy to ‘sail’ without steering clear of wasteful practices (the rocks). Thus Ballard (2008) proposes the following equation:

\[
\text{Allowable Cost} \geq \text{Expected Cost} \geq \text{Target Cost}
\]

\(^{21}\) Although the distinctive feature of the LPDS is the overlapping triangles, which symbolizes the ‘conversation’ between its elements (Ballard et al, 2007)
The target cost is considered to be a real constraint set by the client, which drives the design – not something which emerges from the design (Ballard et al, 2007). However, the ideal here is not to squeeze the designers and construction professionals – target costing should be accompanied with ‘commercial incentives’ (via the relational contract) provided by the Client22 (Ballard et al, 2007:117).

Specifically, the target cost is decided by the Client in the LPDS project definition phase, but may be shaped through a conversation with the project participants by weighting ends, means and constraints, which are jointly established (Ballard, 2008). Thus, even though the engineers, architects and contractors may be ‘unauthorized’ to decide on the ends and the (economical) constraints, they may challenge the Client on these matters, when helping to establish the means and validate project feasibility. Ballard (2008) depicts the conversation as shown below (Figure 5.6.1.1, which can be viewed as a detailing of the first triangle in the LPDS):

![Figure 5.6.1.1: Project definition process (Ballard, 2008)](image)

According to Ballard (2008) purposes are explored by the supply side in order to understand what features of the product (or means) the stakeholders find valuable, which is translated into technical design criteria. However, the immediate envisioned product (the means to accomplish the purpose) may also be challenged. Thus, by doing function analysis of existing practices and considering other options than to build a new facility, it may be decided to pursue the client purpose via other means. Thus, similar to the argument put forward by Blyth & Worthington (2001), the ‘design of use’ comes before the ‘design of the building’ (Ballard, 2008). However, corresponding to the discussion provided in chapter 5.2.2, Formoso et al (2002:421) question whether the problem and

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22 It is notable that this is a lesson learned by the US Department of Defence already in the 1950s, when the early pioneers of value engineering tried to expand their programs to suppliers, who did not get adequate compensation for making cost savings – the results improved significantly, when ‘shared incentive contracts’ were established (Zimmerman & Hart, 1982:13).
solution can be effectively separated. Nonetheless, as design criteria and means to accomplish the client’s purpose becomes clearer so does the constraints and consequently the target cost (if a new building is still the preferred solution to accomplish the purpose).

More specifically Ballard (2008) sub-divides the ‘project definition’ phase into a Business Planning phase and a Business Plan Validation phase. In the Business Planning phase the Client specifies the allowable costs and duration of the project and makes a risk assessment in order to decide whether to proceed. Next, in the Plan Validation phase, the delivery team explores and challenges the business case in order to validate the feasibility and need for a building project. In relation to this, Ballard (2008) makes a corresponding link to the Vision and Realism phases of the VM-model. Likewise, this seems to correspond with the UK notion of the strategic brief (which is provided by the client) and the project brief, which is a response from the supply side to the client’s strategic brief.

When the business plan has been evaluated and target value and constraints have been identified the design development phase is initiated. Here sub-teams are formed with specific target costs, for their part of the project, which are continuously reviewed as the design develops. If estimates at some point exceed the target cost then creativeness should be encouraged in order to find alternative solutions. Otherwise ‘sacrifices’ on the ‘least prioritized’ design criteria should be made. If costs are lower than the target cost, then additional ‘value’ can be build into the project. Accordingly, the method assumes that value is enhanced if the same functions/features can be achieved for a lower cost or more functions/features can be achieved for the same cost – this corresponds to the value-engineering philosophy, although not only ‘functions’ are considered (re Kelly, 2007).

**Quality Function Deployment**

In 1995 Huovila et al (1997a) introduced quality function deployment (QFD) in the lean construction community as a structured approach to prioritize and link customer requirements to technical quality characteristics or ‘design attributes’ (Kamara et al, 1999). QFD originates from industrial engineering in Japan around 1980 and its key distinguishing feature, compared to existing quality management practices at that time, was its emphasis on proactively ‘building in quality’ in stead of inspection and control (Abdul-Rahman et al, 1998). In the following, the use of the technique is illustrated via an example, which takes it outset in a case-study reported in (Houvila et al, 1997a and 1998) where an experiment of applying QFD on a dining room was represented by the matrix shown below (figure 5.6.1.2). This type of matrix is called the ‘House of Qual-
Figure 5.6.1.2: QFD matrix (obtained from Huovila et al., 1998)

- With blue markings made by the author

### Table: QFD Matrix

<table>
<thead>
<tr>
<th>Requirements</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMFORTABLE</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>MODIFIABLE</td>
<td>9</td>
<td>3</td>
<td>9</td>
<td>9</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>FUNCTIONAL</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>9</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>FLEXIBLE</td>
<td>3</td>
<td>9</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>ATTRACTIVE</td>
<td>3</td>
<td>9</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>AMPLE CAPACITY</td>
<td>1</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>CLEAN, CLEANABLE</td>
<td>3</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>UNCOMPLICATED</td>
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<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>INDIVIDUALISTIC</td>
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<td>9</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>ADAPTABLE</td>
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<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Weight Factor (P1)

<table>
<thead>
<tr>
<th>Requirement</th>
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<th>Weight factor %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>142 119 48 54 86 117 213 62 180 44 58 75 44 121 63 105 117 87 111 61 1909</td>
<td>7% 6% 3% 3% 5% 6% 11% 3% 9% 2% 3% 4% 2% 8% 3% 6% 6% 5% 6% 3% 100%</td>
</tr>
</tbody>
</table>

#### Weight Factor (P2)

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<tr>
<th>Requirement</th>
<th>Weight factor</th>
<th>Weight factor %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>131 190 61 67 77 114 216 63 171 45 63 74 45 124 69 105 123 77 114 64 1923</td>
<td>7% 7% 3% 3% 4% 6% 11% 3% 9% 2% 3% 4% 2% 8% 4% 5% 6% 4% 6% 3% 100%</td>
</tr>
</tbody>
</table>

#### Selected

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Abdul-Rahman et al., 1998; Huovila et al., 1998.

The blue markings have been added by the author for explaining the process.
In QFD the customer requirements are first listed in the left column of the matrix – this is also referred to as the “WHATs” or “the voice of the customer” (Kamara et al, 1999). In the example below ‘modifiable’ (marking A) is one such requirement. The importance of this requirement can be weighted on a scale of 1-5, which in this case is five (marking D). Then various design properties – the “HOWs” or “the voice of the designer” (Kamara et al, 1999) – can be listed in the top row, which in this case may be ‘modifiable lightning’ that has high correlation (9 on a scale of 1-9) with the aforementioned requirement (marking C). By multiplying the correlation factor (e.g. C) with the weighting factor (e.g. D), and sum up each result for a specific property, the accumulative weight factor or importance for this property can be determined in relation to all the requirements (for marking B, electric outlets in floor: (9x5) + (3x4) + (9x3) + (9x3) = 111). The design properties with the highest overall weight factors should be of the centre of attention in designing, because they correlate (relatively) highly with most of the requirements that are considered most important. As it can be seen from the bottom row, six of the properties in this example have been selected for further processing. Thus, among other changes, more electric outlets where added in this specific case-study (Houvila et al, 1997a).

For comparison and sensibility analysis, other factors of importance can be assigned to each requirement (e.g. marking E) and additional calculation can be performed. As such, QFD can be used as a means for evaluation and benchmarking for the purpose of planning (e.g. Lee & Arditi, 2006). Accordingly, the literature on (industrial use of) QFD describes a variety of purposes for its application as well as various ‘extensions’ and additional steps, such as translating ‘design attributes’ into component or parts characteristics, which again can be ‘translated’ to manufacturing process characteristics (Kamara et al, 1999). However, the use of QFD in construction is limited (Dickmen et al, 2005) and for that reason the more advanced processes of application will not be described in further detail.

The early findings of Huovila et al (1997a) suggests, however, that (the exemplified) use of QFD indeed provides a usable systematic method to ‘process’ customer requirements, mapping of decisions and it forces the customer to become aware of his or her demands. Thus, the most critical phase of QFD was found to be the establishment of customer requirements (Houvila et al, 1997a). Accordingly, it has been suggested by other researchers that QFD can be linked with function analysis (Kamara et al, 1999; Cariaga et al, 2007). However, in the case studies reported by Huovila et al (1997a) QFD was also found laborious and it was difficult to differentiate between customer requirements and building properties. This may have proven to be essential barriers for a more widespread adoption of the concept in construction. Indeed, when reviewing the papers of (Kamara et al, 1999) and (Cariaga et al, 2007) the amount of data processing
steps seems immense. Despite the fact that computer software may ease the process, the potential benefits of the methodology may not be worth the effort. Within the context of lean, it is also notable that Sobek et al (1999) found that Toyota rarely use QFD techniques.

**Reverse phase scheduling and cross functional teams**

As described in the chapter on lean product development, set based design is about concurrent development of product solutions through the creation and explicit communication of sets (or ranges) of alternatives, which are all kept ‘open’ until ‘the last responsible moment’ (Ballard et al, 2007; Ballard, 2008). This last responsible moment can be determined through reverse phase scheduling, which basically means that all parties and stakeholders in the project make a schedule by working backwards from the deadline by including the duration of all necessary steps (this is often done by means of simple post-it notes on a wall and reflects the ‘pull’ principle in lean as oppose to ‘pushing’ activities forward). Thus, set-based design entails the identification of all external as well as internal ‘customers’ of design, which also include permitting agencies. All parties should be involved from the very beginning and if possible phased agency reviews should be adopted (Ballard et al, 2007; Ballard, 2008). This also connects to another lean principle, which is cross-functional teamwork. However, as described in the chapter on LPD, a balance should be struck between large group meetings for work alignment and performing the work individually or in smaller teams (Ballard et al, 2007).

**Production planning and control: DSM and LPS**

Whereas the literature on relational contracting, target costing and set-based design is fairly limited in (lean) construction research, there is noticeably more publications on production planning and control or flow management (in design) by means of the Last Planner® system (LPS) and the Design Structure Matrix (DSM).

In 1995 the DSM was introduced in the lean construction community by (Houvila et al, 1997b) and the idea is basically to (1) list all (design-) activities in a matrix (2) identify interdependencies and (3) restructure the sequence of activities (through a mathematical algorithm) according to interdependencies and groups of coupled activities. An illustrative example of this is shown in figure 5.6.1.3 (adopted from Hammond et al, 2000). The figure shows the same tasks before (to the left) and after (to the right) they have been structured according to dependencies. In the left matrix it can be seen that task A is dependent on input from task B and H; task B is dependent on task F etc. It can also be

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23 Activities that produce information in a combined cycle, where the first activity needs information from the last activity and therefore must be solved in an iterative manner.
seen that since task F and B are mutually dependent, they must be solved together via iteration. They are therefore grouped together in the right matrix.

Consequently, this is a way of planning design activities, which explicitly identifies activities that should be the subject of iteration. Also, it visualizes which tasks that give input to many other tasks and therefore are critical (especially if changed) to the design process (Houvila et al, 1997b). However, in a case-study reported in (Houvila et al, 1997b) the use of DSM illustrated that the first 15 tasks of a design schedule should be solved ‘together’, since they were all coupled. This demonstrates the challenge of planning the early design phase and also highlights that the DSM does not provide means to accommodate this problem – it only identifies it. Yet, as pointed out by Houvila et al (1997b) this may be a critical first step in addressing a problem. It should be noted that the actual problems experienced within this case-study, related to the inability of the client to define user requirements to the architect (Houvila et al, 1997b).

![Design Structure Matrix](image)

*Figure 5.6.1.3: The Design Structure Matrix (adopted from Hammond et al, 2000).*

Subsequently, the DSM has been linked together with the Last Planner® system (LPS) of production control (Koskela et al, 1997; Hammond et al, 2000, Koskela et al, 2002) as a means to perform ‘adaptive scheduling’ and management of the variance, which constantly occurs after initial DSM planning due to changes in the environment, knowledge etc. A lot can and has been said about the LPS, which is the most documented tool within the Lean Construction community. However, since it has more to do with planning and control than ‘value design’ it will only be briefly described in the following (because it was used in one of the case-studies).

The phrase:”Last Planner” refers to the person who actually performs the (manual) work and therefore essentially is the last planner – this is either the designers (in the design phase) or the craftsmen (in the site-production phase). The Last Planner® System of Production Control includes several levels of planning, which connects the deadlines in the overall master schedule to the last planners’ weekly work plan through a process that aims to proactively identify and remove constraints to the schedule and
“shield” the last planners from commencing ‘unsound’ activities (unsound because of lack of information, lack of materials, resources etc). This is done via an intermediate, dynamic 6-8 weeks look-a-head schedule that is updated each week with the latest constraints and changes in scheduling.

Thus, LPS builds on a chaos theory and provides a structured approach to perform “adaptive planning” where the last planner “pulls” work from a backlog of ‘sound’ activities (made ready via the look-a-head planning). This is in opposition to traditional “push” management where centralized planning aims to enforce activities (which may not be ready) upon the persons who are to perform the work. Progress, improvements and learning are measured via simple recording of percentage planned completed (PPC) and root-causes for lack of plan compliance (via asking ‘why’ five times). The overall framework is outlined in the figure 5.6.1.4 (obtained from Ballard, 1999).

Choosing by Advantages
Choosing By Advantages (CBA) is a decision-making system developed by Jim Suhr. As a civil engineer, working primarily in the U.S. Forest service, he spent most of his life trying to come up with an effective and sound decision-making system (Suhr, 2003). Now he is president of the Institute for Decision Innovations. CBA was used as part of the lean ‘toolbox’ in one of the case-studies, and has also been linked to lean construction in an academic context (Parrish & Tommelein, 2009). In addition, it has been described in connection to Value-engineering (Suhr, 2003; Koga, 2005). However, CBA has primarily been adopted by the U.S. National Park Service and the U.S. Forest Service, but it is also meant for individual everyday decision making (Suhr, 2008).
In addition, Suhr (2008) stresses that the adoption of CBA can make the world a better place. This is partly because of the positive social ‘side-effect’ of choosing by advantages – not disadvantages. The notion of disadvantage has a negative cling to it, which can easily lead to conflict among proponents of competing alternatives. Furthermore, Suhr (2003) draws on the following (rational) cause-effect model: (1) methods for decision-making → (2) decision → (3) action → (4) outcome. The logic deduction is that if the methods for decision-making are ‘wrong’ it is likely to result in bad outcomes, which means mistakes and conflicts. In addition, Suhr (2008) argues that decision making, which commonly includes both advantages and disadvantages, leads to ‘double counting’, since the disadvantage of one alternative is an advantage of another alternative.

Thus, the overriding slogan is that decisions should be based on the importance of advantages (not factors, criteria, goals, objectives etc.). An advantage is always comparative, consequently this principle entails that decisions should be based on (the importance of) differences between alternatives (and only prospective differences). A third principle is that sound decisions must be based on facts – not assumptions. Thus, in order to ensure ‘soundness’ the decision maker should “use correct data correctly”. To this end, the method carefully applies a specific vocabulary to distinguish between important notions in decision-making. These include (Suhr, 2003:6)

- **Factor:** An element, part, or component of a decision. It is also a container for criteria, attributes, advantages and other types of data

- **Criterion:** A decision rule or guideline. It is also any standard on which a judgement is based

- **Attribute:** A characteristic, quality, or consequence of one alternative. And, an alternative is a person, thing, or plan.

- **Advantage:** An improvement, gain or betterment. Specifically, it is a favourable difference between the attributes of two alternatives

Within this view, although it seems relatively straightforward, one cannot answer the question: is safety or productivity more important? Safety and productivity are (abstract) factors that should relate to specific alternatives and facts. Accordingly, for each of these factors, the criteria (we prefer a low level of injuries and high productivity) and attributes (type and frequency of injuries, bullets produced per man-hour etc) need to be considered and the relative advantages of alternatives (positive difference between the attributes of each alternative) must be determined. Notice that the type of injury may be very important in this ‘equation’ – there is great difference between a few small bruises.
and getting fingers cut off. Also, ‘productivity’ may be a matter of survival and winning the war, or just a slightly better market position. Therefore the importance of the relative advantages needs to be assessed in the end (e.g. how important is 10 fewer bruises per year? How important is 100 more bullets produced per man-hour?). This is fundamentally a subjective judgement; however, having made these considerations, the basis for making the choice is more informed.

There is much more to be said about CBA, which incorporates several methods, especially when considering aesthetics and money (it is assumed that the cost of each alternative is equal in the above example). However, for the sake of delimitation, the topic will not be treated any further here, except for a few closing reflections.

Accordingly, the acknowledgement of subjectivity and reliance on procedures, to achieve sound decisions, places CBA in the category of prescriptive decision models (or procedural rationality) described by Green (1996b:120). It should also be noted that the existence of ‘definable advantages’ is a prerequisite for application – “the domain of CBA excludes decision that cannot be logically considered” (Koga, 2005:2). CBA assumes the existence of ‘facts’. For additional reading on decision-making see the publications referenced and particularly Green (1996b), who provides a review of decision-making models.

5.6.2 Critical perspectives

The critique of Lean construction is sparse and has mostly been concerned with the same issues mentioned in relation to lean production; e.g. exploitation of workers and lack of critical research (Green, 2000, Jørgensen, 2006). In addition, lack of clarity regarding central lean terms (e.g. the definition of lean design or lean construction) and the differences in context, between car-manufacturing and construction projects, have been debated (Jørgensen, 2006). More importantly to this dissertation, critique has been raised regarding an over-simplified understanding of value as ‘product value’ (e.g. Wandahl & Bejder, 2003; Jørgensen, 2006). However, this issue has subsequently been addressed in a number of publications (Thyssen et al, 2008, Rooke et al, 2010; Salvatierra-Garrido et al, 2010), and also spurred the current research project.
## 5.7 Overview of management concepts

<table>
<thead>
<tr>
<th>Description</th>
<th>Selected methods and tools</th>
</tr>
</thead>
</table>
| **Briefing** | - Various data collection methods  
- Ways of stimulating client reactions to learn about their needs (excursions, simulations etc.)  
- Ways to assess (the need for) and incorporate adaptability (DBD)  
- Structured methods for option appraisals (risk and feasibility analysis) e.g. by use of stage-gates® |
| VM | - Workshop processes (team-oriented) including:  
- Value-tree (product oriented) and  
- Diagrams for displaying priorities (trade-offs) |
| VE | - The ‘job-plan’ including:  
- Function analysis (FAST)  
- Quantitative decision support matrixes |
| **VBM** | - Diagrams for displaying individual and shared values (process oriented)  
- Performance measurement systems (to audit compliance between behavior and agreed values) |
| **LPD** | - Decomposition of overall vision to sub-unit performance criteria  
- Design to performance criteria  
- Frontloading incl. set-based concurrent engineering  
- Matrix organization with cross-functional chief engineers and module development teams  
- Early inclusion of supplier knowledge  
- Simple and visual communication (e.g. A3 reports)  
- Standardization  
- Focus on reflection/learning  
- Socialization/VBM |
| Lean Construction | - In addition to some of the tools above:  
- Relational contracting  
- Target costing  
- Quality Function Deployment (QFD)  
- Design Structuring Matrix  
- Reverse-phase scheduling and Last Planner®  
- Choosing By Advantages (CBA) |

*Table 5.7: Overview of management concepts*
The table above aims to provide an overview of the approaches described. It should, however, be stressed that many of the methods and techniques are not confined to a single management approach. For example, QFD is also referred to as a Value-management tool in Kelly et al (2007) and Value-management may be viewed as a tool within traditional briefing. CBA may be used together with almost all of the concepts. Also, in one of the case-studies function analysis is used as part of the lean toolbox. Thus, the different ‘concept communities’, borrows techniques and methods from each other.
6 Case-studies

In this chapter four case-studies will be presented and analysed separately. The figure below highlights the contents and positioning of the chapter within the overall research design. As stated before, this chapter is a core chapter in the thesis and provides the empirical ground for the synthesis and conclusions. The case-studies include (1) a Danish social housing project, (2) a Danish university- and nursery building, (3) a large American Hospital project and (4) a small Danish (low-energy) university guest house project. Altogether, 23 interviews have been conducted and 39 meetings have been observed. Each of the four sub-chapters will in general be structured according to the following headings: introduction, case-study relevance, data-collection and case-study objectives (research questions), data, analysis and meta-theoretical reflections. Furthermore, at the end of each sub-chapter, a summary will be provided. However, to give an initial overview, the key figures and overall information about the four case-studies are provided in Table 6.1 (next page).
The elements included in 'capital cost' may differ for each case-study. The specific contents of estimates and budgets have not been scrutinized.

The project was cancelled because of insufficient funding. No reliable data were acquired regarding the budget.

Table 6.1: Key figures and overall information about case-studies

<table>
<thead>
<tr>
<th>Overview Case-studies</th>
<th>Case 1: Social housing</th>
<th>Case 2: University office and nursery building</th>
<th>Case 3: Hospital</th>
<th>Case 4: Low energy university guest house</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country</strong></td>
<td>Denmark</td>
<td>Denmark</td>
<td>USA (California)</td>
<td>Denmark</td>
</tr>
<tr>
<td><strong>Scope</strong></td>
<td>Two buildings containing 42 social housing apartments.</td>
<td>A new university office and education building that is also to include a nursery</td>
<td>The hospital will comprise 555 beds in a 15 stories building, with two additional (parking) levels below grade in downtown San Francisco (earthquake area)</td>
<td>A demonstration, zero energy university guest-house, with three apartments</td>
</tr>
<tr>
<td><strong>Owner</strong></td>
<td>A non-profit organization</td>
<td>A real-estate administrator</td>
<td>A private health care organization</td>
<td>An independent foundation</td>
</tr>
<tr>
<td><strong>Funding</strong></td>
<td>Owner and the city council</td>
<td>Owner</td>
<td>Owner</td>
<td>Owner and a building component supplier (alias CS-group)</td>
</tr>
<tr>
<td><strong>Other parties</strong></td>
<td>Public authorities</td>
<td>End-users:</td>
<td>End-user</td>
<td>End-user</td>
</tr>
<tr>
<td></td>
<td>- The municipality (has right of disposal of the 32 senior apartments)</td>
<td>- The university campus administration</td>
<td>- University Pacific Medical Centre – CPMC (client/user)</td>
<td>- University</td>
</tr>
<tr>
<td></td>
<td>- Consultants/contractors</td>
<td>- The department staff</td>
<td>Consultants/contractors</td>
<td>Consultants/contractors</td>
</tr>
<tr>
<td></td>
<td>- Architectural company</td>
<td>- A nursery</td>
<td>Smithgroup (Arch. firm)</td>
<td>Architectural firm (alias A1)</td>
</tr>
<tr>
<td></td>
<td>- Landscape architectural company</td>
<td>- Various public authorities</td>
<td>Degenkolb (Eng. firm)</td>
<td>Designing architectural firm (alias A2)</td>
</tr>
<tr>
<td></td>
<td>- Engineering consultancy company</td>
<td>- Consultants</td>
<td>Herrero&amp;Boldt (GC)</td>
<td>Engineering firm</td>
</tr>
<tr>
<td></td>
<td>- General contractor</td>
<td>- Architectural company</td>
<td>Various sub-consultants and sub-contractors (called trade-partners)</td>
<td>Main contractor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Landscape architectural company</td>
<td>- Lean consultants and researchers</td>
<td>Low-energy building researchers from the university</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Engineering consultancy company</td>
<td></td>
<td>- Research assistant</td>
</tr>
<tr>
<td><strong>Capital cost</strong></td>
<td>53,400,000 DKK (realized)</td>
<td>~140,000,000 DKK</td>
<td>~5,230,000,000 DKK</td>
<td>No estimate was acquired**</td>
</tr>
<tr>
<td><strong>Floor area</strong></td>
<td>3,624 m²</td>
<td>5,110 m²</td>
<td>~148,640 m²</td>
<td>~350 m²</td>
</tr>
<tr>
<td><strong>Procurement</strong></td>
<td>Turn-key</td>
<td>Undecided</td>
<td>Integrated project delivery</td>
<td>Partnering</td>
</tr>
<tr>
<td><strong>Project stage</strong></td>
<td>Detailed design stage</td>
<td>Conceptual design stage</td>
<td>Detailed design stage</td>
<td>Conceptual design stage</td>
</tr>
<tr>
<td><strong>Management method</strong></td>
<td>The workshop model (lean/value management)</td>
<td>None</td>
<td>Lean / value engineering</td>
<td>“Integrated energy and design process”</td>
</tr>
<tr>
<td><strong>Data collection method</strong></td>
<td>Interviews (sound rec.), observations and text-analysis</td>
<td>Observations (sound rec.) and text-analysis</td>
<td>Interviews (sound rec.), observations and text-analysis</td>
<td>Video recoring (observation)</td>
</tr>
</tbody>
</table>
6.1 Case 1: Social housing

6.1.1 Case description

The social housing project was first initiated in 2005 and consisted of two buildings; one of three storeys and one of five storeys, together containing 42 apartments with a total floor area of 3624 m² and a capital cost of 53,400,000 DKK (USD 9.2 mill). The client was a non-profit organization that owned 13,000 dwellings in the Copenhagen area. The dwellings were constructed with financial support from the city council, which therefore had a right of disposal of 32 of the flats. These were designed for elderly people who require care. The 10 remaining flats were designed for families with a disabled child.

The ‘client’ comprised a board of residents but would be termed an experienced client in a Danish context. The client representative in charge was indeed experienced; with an educational background as a carpenter and a bachelor in social science, he had worked his way up from foremen to (contractor) project manager at a large Scandinavian contractor company and had now become head of subject in the client organization.

The project was part of a larger development plan, which also included 72 owner occupied flats that were finalized in 2007 and 82 rented flats which were finalized in 2008. In addition, a third block of 30 owner occupied flats were to be built in continuation of the Social housing project. Although the different parts of the build-up area were constructed for four different clients, the architects had designed all buildings. The aim was
to provide a cohesive expression with regard to shape, materials and colours across all buildings.

The application of the workshop model was set up through earlier cooperation between NIRAS, the client and the architectural firm and gained status as an experimental project via the Danish Ministry of Social Welfare. This meant that the project was exempted from public tendering legislation (a bid-round was not mandatory). The participants did not have prior experience with the workshop model, except for the process facilitator. The first workshop (workshop 0) was conducted in spring 2005 and the process continued into autumn 2005 when the last workshop was held, after which the (initial) contractor withdrew because of financial concerns, and the project stopped.

The project recommenced in 2007 when a new turn-key contractor, who had managed the two earlier projects in the development, came on board. Also, a new engineering consultant and landscape architect were assigned to the project and new representatives of the municipality were included in the workshops. The engineering consultant knew the turn-key contractor beforehand and the landscape architect had worked with the architects on earlier projects.

At this point it was decided to restart the workshop process to ‘integrate’ the new participants and evaluate the design, which was well developed because of the work performed in 2005. This gave way for some interesting developments, which will be described below. The project was finalized on time – some dwellings were even handed over three months ahead of schedule. The following presentation and analysis only addresses this second round of applying the workshop model.

**Case study relevance**

The case-study provided a first-hand opportunity to observe the application of the workshop model which is considered, by some researchers and practitioners, to be state-of-the-art in construction design management – at least within a Danish context. Given the focus of the research, the case-study can therefore be seen as a critical case.

**6.1.2 Data collection and case-study research questions**

Data were obtained through passive participation and observation at each workshop (in the second round). In addition, 7 interviews with 9 of the key participants, representing the architects, the landscape architect, the engineering consultants, the municipality, the contractor, the client and client’s facility management, were conducted a year after (In January and February 2009), when site construction was in its final stage. In addition,
various project documents – including the minutes of the workshops conducted in the first round – provided background information (because the industry partner of the PhD project participated as facilitator, the researcher had good access to project documents).

However, because the research project had only just started, when the workshops were conducted (in 2007), the research design and protocol had not been fully developed. Nonetheless, it was decided to ‘just’ observe how the workshop model was conducted and focus on any developments or issues that arose during the workshops. No sound recording was allowed and thus the data obtained were in the form of written notes which became the basis for the minutes of the meetings. These were subsequently approved by the participants. Almost a year after, when the research design had been further developed; an interview guide was constructed, which can be seen in appendix 3. This formed the basis for the semi-structured interviews. The interviews were sound-recorded, transcribed and translated by the author. Each interview lasted for about an hour. In light of research question 2 and 3, the purpose of conducting the interviews was to get insight into the participants’ experience of the workshop process with specific emphasis on ‘issues’ and ‘effects’ (if any). This could provide a more nuanced picture in relation to the initial observations; had the participants experienced any effects or problems in relation to the concept? Subsequently, when the research design had been developed to its final stage, the transcripts and notes were analysed again with specific emphasis on research question 1: were there any examples of the participants expressing or acting on what appeared to be individual preferences or values?

As part of the hermeneutic circle of inquiry (and the explorative-integrative approach), the researcher also set out to test his pre-understandings. The pre-understandings came out of the meta-theoretical reflections described in the methodology chapter (chapter 2.4.4). Accordingly, the following supplementary sub-questions were investigated:

\[ \text{a. What are the interests of the designers (architects and engineers) as well as contractors’ to engage in the workshop model? And why may they not be motivated to participate or contribute to ‘client value’?} \]

\[ \text{b. What may compromise construction clients’ capability and motivation to express their values and needs in the conceptual phase of construction projects?} \]

\[ \text{b1: Did the client’s values change?} \]
\[ \text{b2: Did the client find it difficult to express his values?} \]
\[ \text{b3: Did the client perceive it as risky (because of item b1 and b2) to state his values early in the process (because of the risk of being held responsible)?} \]

\[ \text{c. Is client value an ideal and/or discoursive trap?} \]
d. What role frames were evoked?

The first question (a) partly came out of critical theory reflections on the participants’ supposedly self-interest and inclination to manipulate. Therefore this question will be dealt as part of the sub-analysis inspired critical theory. Question b also came out of critical theory, but includes some sub-question b1 and b2 which can be dealt with within the hermeneutic perspective. Question c and d will be addressed within the postmodern perspective. In relation to the overall purpose of the research, question a, b, c and d may also be seen as sub-questions to research question 2, regarding ‘issues’ in relation to client value creation.

In summary, the overall purpose of the case-study was to investigate:

1. How did the participants’ perceptions of value manifest? (RQ 1)
2. What are the problems and effects, which the participants associate with the application of the workshop model? (RQ 2 & 3)
3. Test of pre-understandings

In the following, parts of the data will be presented to give an impression of what happened in the workshops. The full minutes of the meetings (written in Danish) are available to the review panel, but not the wider public. After having outlined the workshop meetings, the second question in the above list will be examined via interview quotes. Although this selection of quotes necessitates analysis, it is mostly a matter of describing what the interviewees said about (1) effects and (2) problems. These quotes are therefore included in the “data section” below. Afterwards, the three meta-theoretical perspectives are applied separately to (further) analyse the data. This section addresses all of the above questions. As a supplement to the data already presented, the analysis also draws on interview quotes, which seemed irrelevant to include in the data section. Finally a summary will be provided, where the main conclusions will be outlined. It should be noted that all interviewees and participants are anonymous. Thus, the interviewees/participants are either called by their profession or a two-letter alias in parentheses (these two-letter aliases correspond to the transcripts, which are available to the review panel).
6.1.3 Data

The workshops

Three workshops were held with an average of 13 participants comprising architects, engineers, landscape architect, contractor representatives, process facilitator, client project manager, facility manager, client in-house experts/engineers and landscape architect and city representatives (some specialists did not attend all of the workshops). Each workshop lasted 4-5 hours and there were about 10 days in between each session.

Workshop 1

Workshop 0 and workshop 1 were merged together in order to save time. It seemed appropriate to condense the process because the design had already been developed to a level of ‘detailed design’ (see process model chapter 3.2). Judging from the agenda, the purpose of the first workshop was at least threefold; to introduce the concept to new participants, to clarify ‘process values’ and to clarify client ‘product values’. The introduction was made by the process facilitator who outlined the history of the project, the experimental scheme and the reasoning behind the workshop method. The latter included some theorizing about value with some (invited) comments from the audience about “what is value?”, “value to whom?” and “who is the customer?” In addition, the process facilitator emphasized that in this project the budget had to be seen as a constraint – not as a (modifiable) result of design. The distinction between product and process value was introduced, which (after a break) led to a discussion of process values. The agreed process values can be seen in table 6.1.3.3 (under the heading of the third workshop) together with the result of the evaluation performed in the third workshop. In relation to the item ‘willingness to make compromises’ the permitting agency’s role was discussed; would they be willing to make compromises? The representatives from the municipality’s Health and Care Committee stated that they had no authority over the case-workers. They could only provide input regarding the needs of the end-users. However, no greater argument about the process values was observed and no ranking was performed. Then they redirected focus towards the product values.

The client representative made a presentation, where he stressed the need to consider operation and maintenance, which would be performed by the client organization after hand-over. Thus, the client representative described his organization as different from a developer in that the client’s perspective was broader. A client representative then introduced their ecological policy. The resulting ‘product values’ can be seen in Table 6.1.3.1a and 6.1.3.1b. Most of the value-tree was reused from the first round of workshops; however, the text marked with red colour shows the detailing/changes performed.
in the second round of workshops. No explicit, numerical ranking was made at any point in the process.

<table>
<thead>
<tr>
<th>Basic value</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beauty</td>
<td>Form</td>
<td>Interaction with other buildings</td>
<td>The motif should be consistent</td>
</tr>
<tr>
<td></td>
<td>Coherence in gardens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expression</td>
<td>Simplicity. Inspired by Kaj Fiskers work</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;characteristic&quot; [spil i] facade for example in relation to balconies and entrances.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interplay in facade colours – &quot;the white city&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Users are very concerned with finished surfaces.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spaciousness</td>
<td>Materials</td>
<td>Robustness and coherence</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Light</td>
<td>Light is important – it’s play and amount</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light all the way through the apartments</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility</td>
<td>Function (buildings)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Easy to furnish</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kitchens &quot;closed&quot; instead of &quot;open space&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good facilities for storage close to the apartments.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good access in facades</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good outdoor/indoor possibilities via balconies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexibility (in relation to interior walls)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Common facilities (maybe via a common room)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Facilities to the janitor - common</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Open space</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good access ways</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Consideration of elderly physically disabled occupants – room for care personnel and use of wheelchair.</td>
<td>Special considerations for elderly</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Function (garden)</td>
<td>Cover the needs of different types of occupants</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flexibility and function for all age groups</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Levelled access-ways/ramps</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Engineering</td>
<td>IT – wish to be up to date and prepared for future developments (new code)</td>
<td>Be aware of the new code in 2006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HVAC – wish to be up to date and prepared for future developments (new code)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Environment</td>
<td>Good indoor climate with &quot;healthy&quot; materials and extraction (cf. code)</td>
<td>Ecological goals should be discussed with the person in charge of sustainability in the client organization.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Injection is also a wish</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good occupant environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Good recreational areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Good possibilities for creating social relations among the occupants</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safety</td>
<td>Illumination of access-ways</td>
<td>Should be clarified</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Access control</td>
<td>Should be clarified</td>
</tr>
<tr>
<td></td>
<td>Work environment</td>
<td>Janitor facilities should live up to the standards for good work environment</td>
<td>E.g. good illumination of shower etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Facilities in the dwellings for disabled and elderly occupants should live up to standards for good work environment</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Good work environment during construction</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.1.3.1a: Value-tree (part 1 of 2)
The client’s presentation lead to a discussion about capital cost in relation to total-life-cycle cost. Although the client would like to invest in future benefits, the budget frame

<table>
<thead>
<tr>
<th>Durability</th>
<th>Operation and maintenance</th>
<th>Low operation and maintenance cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• Prefabricated shower cubicles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A few light facade modules</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Robustness in choice of materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Especially the basic non-replaceable components needs to be of a high quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Pipes in stainless steel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Minimalistic buildings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Only a few complex joints/material combinations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Focus on durable balcony solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Future-proof choice of materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Thoroughly tested and replaceable when worn out</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The easy replaceable components should be standard components</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Good O&amp;M material</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Easy access and management for O&amp;M personnel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- E.g. regarding garbage disposal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Use of overflow signals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Easy access to installations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Remote measurement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Flagstone pavement need to be able to resist vehicles with garbage containers etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low moving expenses</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total life-cycle cost</th>
<th>Focus on optimal life-cycle cost</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Suitability to surroundings</th>
<th>Relation to surroundings</th>
<th>The buildings need to be considered in the context of the adjacent buildings. Should the buildings relate to the activity house?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needs of the area</td>
<td></td>
<td>Should the path system do anything in relation to the area?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental impact</th>
<th>Emission</th>
<th>Low emission connects with low operation cost No basement to avoid treatment of polluted soil</th>
<th>The county should be contacted regarding assignment</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Consumption</th>
<th>Low consumption connects to low operation cost, including:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Good waste management</td>
</tr>
<tr>
<td></td>
<td>• Collection of rain water</td>
</tr>
<tr>
<td></td>
<td>• Low energy consumption</td>
</tr>
<tr>
<td></td>
<td>- Heat-recovery in ventilation system</td>
</tr>
<tr>
<td></td>
<td>- Visible meters (that foster savings)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other</th>
<th>Use of suppliers with environmental management systems</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Constructability</th>
<th>System and delivery</th>
<th>Prefabricated shower cubicles</th>
<th>Should be considered for the sake of quality and mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Prefabricated concrete elements</td>
<td>Avoid ‘crooked’ dimensions [skarve mål] so the amount of depositings are minimized</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Functional installation routing</td>
<td>Are there to be balconies at the ground floor or should they be replaced with entrances to the garden?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Balconies as a system delivery?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construction</th>
<th>Focus on optimal building process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simple solutions and only a few collisions in relation to materials.</td>
</tr>
<tr>
<td></td>
<td>Level the use of dirt / excavation to minimise pollution issue and earthwork operations.</td>
</tr>
</tbody>
</table>

*Table 6.1.3.1b: Value-tree (part 2 of 2)*
did not allow for much investment. However, all solutions that had a pay-back time less
than five years should be incorporated. The client representative furthermore stated that
he would like a mapping of the grounds for decision making, so the client would be able
to communicate these to future users. The contractor pointed out that in order to follow
the timetable, the design would have to be “frozen” within 2 to 2½ months time.

They carried on speaking about the value-tree and discussed the three items: utility, d u-
rability and sustainability. In relation to utility, the client stated that, to the extent it was
possible; they would like to arrange the 32 apartments in such a way that they would be
equally useful to other types of residents, than elderly people in need of care. The repre-
sentatives of the municipality, however, commented that they would like to maintain the
elderly people in the flats for as long as possible. However, they were not completely
certain about the extent to which the elderly people would stay, before moving to a real
care home. Since this would impact the level of equipment and measures for care, which
had to be incorporated, the representatives promised to clarify this together with
client before the next meeting.

Under the heading ‘durability’ (within the sub-category operation & maintenance), it
was noted that the gardens for the elderly and disabled people would probably require
care from the clients operations personnel. In addition, the garbage disposal system was
discussed in relation to the end-users and operation. The flagstone pavement should be
strong enough to carry vehicles driving around with large garbage containers.

Regarding MEP work, stainless steel pipes were to be used in shafts, which needed to
be easily accessible. Likewise all meters had to be easily readable. This was also impor-
tant in relation to the users – hidden meters would not motivate the users to decrease
their consumption. Ways to accommodate these wishes were discussed. Furthermore it
was noted, that the ventilation system only included air extraction. To improve indoor-
climate and energy-consumption, the client would like to incorporate air-injection and
heat recovery as part of the ventilation system.

At the end of the meeting it was decided that the architects had to consider how the ex-
isting design conformed to the ‘product values’. In addition, the contractor had to con-
sider the different wishes and solutions in relation to the budget.

**Workshop 2**

The process facilitator initiated the second workshop by reminding the participants
about what had been accomplished in the former workshop. In addition, the program for
the second workshop was outlined. The client informed the participants that they had,
since the last workshop, conducted two meetings with representatives of the municipality where focus had mainly been on ‘plan-solutions’ (as in plan-drawings) and installations. This would also be the focus of the current workshop. However, initially the process facilitator presented the result of the former debate about process values – these had now been summarised in the ‘collaboration charter’ shown below (the workshop model partnering agreement). The presentation of the process values lead to a discussion about whether it was necessary to also agree on a model for conflict management – according to the participants there was no way denying that the parties had different interests. In addition, the charter would not have any formal validity in relation to the contracts. However, the contractor representatives stated that their company was very focused on having a collaborative attitude and providing value to the client. The participants ended up agreeing on the collaboration charter, but did not develop any rules for conflict management. They agreed, however, that it had been a good talk.

Then they continued talking about more concrete design solutions. As indicated in the former workshop (during the discussion about the extent of care for the elderly people), the representatives of the municipality seemed to have a different view on the needs of the end-users than what had been communicated in the first round of workshops (in which a different representative of the municipality had participated). This had been further clarified in the meetings between the client and municipality subsequent to the first workshop in the second round. Apparently the elderly end-users were less self-sufficient and less mobile than initially anticipated. This new understanding had spurred new wishes from the client, which the architects had tried to incorporate. The architects presented the design and the latest developments. The following most important topics were noted:

- One of the pathways and a ramp in the garden had been omitted because there was limited space and the users would probably not use it anyway
- According to the district plan, the buildings in this development-area should have a coherent architectural expressing. For this reason, the first project (owner occupied flats) that was finalized the same year had become reference for the second project which was currently underway. This included a simple expression, a flat roof and a rather exclusive, yellow facing brick. Therefore the architects would like to carry over this expression to this particular case. So did the client, but this was somewhat depending on the costs
- Various changes to the indoor arrangement:
  1. Access ways had been modified to accommodate disabled people e.g. doors had been widened and some had been changed to sliding doors to avoid obstructing the wheel chair turning-diameter. The
elevator had been moved and weather porches had been removed, so the elderly disabled occupants could drive directly into their apartments in their wheel-chairs or mini-crossers.

2. Bath and bed-rooms had increased in size, so that care-personal had more room to help the occupants getting in and out of bed etc. Also, the turning diameter for wheelchairs had consequently been increased.

3. This meant that the kitchens had become smaller, but the occupants were not likely to do much cooking themselves anyway.

- Up-grade of the ventilation system with injection air (and heat-recovery) was still considered to improve the indoor climate in which the disabled users would stay most of the day (now the necessary space had been identified for the extra ducts and valves etc.).

Especially the last item was relatively expensive and the contractor was asked to consider solutions which could be incorporated within the current budget frame.

<table>
<thead>
<tr>
<th>Change proposal</th>
<th>Savings approx, DKK</th>
<th>Total lifecycle cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>French balcony instead of a normal balcony (in building 1)**</td>
<td>200-250.000</td>
<td>++</td>
</tr>
<tr>
<td>Saw-dust wall covering instead of felt wall covering</td>
<td>100.000</td>
<td>–</td>
</tr>
<tr>
<td>Cooker can be changed to a couple of hotplates and a small oven in 27 of the apartments</td>
<td>50.000</td>
<td>+ (small)</td>
</tr>
<tr>
<td>Halving of the amount of wardrobes</td>
<td>100-120.000</td>
<td>+ (small)</td>
</tr>
<tr>
<td>Omit basement (expect for the heating central and janitors office)</td>
<td>100-150.000</td>
<td>+</td>
</tr>
<tr>
<td>A cheaper facade brick</td>
<td>350.000</td>
<td>Neutral</td>
</tr>
<tr>
<td>Terrazzo staircase in building 2 can be changed to a concrete staircase</td>
<td>150-200.000</td>
<td>–</td>
</tr>
<tr>
<td>Ordinary door telephones instead of video telephones</td>
<td>12-15.000</td>
<td>+</td>
</tr>
<tr>
<td>Only a single filling of the concrete ceilings</td>
<td>50.000</td>
<td>Neutral</td>
</tr>
<tr>
<td>Gerigts can be ‘fired’ on</td>
<td>50.000</td>
<td>– (maybe)</td>
</tr>
</tbody>
</table>

* ++ means large savings, + means savings, – means extra cost in a long term perspective
** Balconies were a district plan requirement, but the participants wanted to test how fixed this requirement was

Table: 6.1.3.2: Change proposals
Next item on the agenda was to consider whether the design lived up to the client’s product values. The client expressed great satisfaction with the latest developments in the design. The municipality representatives were also pleased with the changes. The value-tree was then reviewed, but this did not give raise to any further comments.

Next the budget was considered. Here the contractor again emphasized that the incorporation of injection air and heat-recovery could only be achieved with rather large compromises in other parts of the design to release the necessary money (approx 600,000 DKK). A brainstorm was conducted regarding alternative design solutions which could provide the necessary savings. The potential savings that were mentioned can be seen in table 6.1.3.2:

It was decided that the municipality representatives and client would need to consider these suggestions before the last workshop. In addition, the contractor had to qualify the preliminary approximated cost of these items. At the end of the meeting the client representative in charge stated that he thought it had been an extraordinary good meeting.

Workshop 3
On the third workshop the client and municipality had decided on the changes that were to release the necessary savings in order to incorporate the up-graded ventilation system (and changes in size of bed and bath rooms etc.). These were:

- French balconies were changed to windows (ordinary balconies in the living rooms were maintained)
- The basement was reduced in size (no common room or kitchen)
- A reduction of wardrobes

The ordinary balconies were maintained because it turned out to be an important component to the municipality. Also, the façade brick had been maintained and, according to the architects, the overall architectural expression had been enhanced with the reduction of the basement. The architect summarized all the changes for each type of dwelling. Some derived consequences of the changes were discussed (e.g. are the kitchens big enough? Should the type of floor at the entrance of each apartment be changed now that the weather porch was removed?) Also, the shafts had not been fully detailed yet and the installations might require more space.

After some discussion they turned to the landscape design, which was presented by the landscape architect. During the presentation some issues were discussed in relation to
separation of parking and pedestrian traffic, grass vs. plants (the latter is cheaper to maintain). Other topics were: the need for illumination, fire access routes, playground facilities, space for containers and bike parking. Regarding playground facilities it was noted that the decision could wait. However, if the decision was postponed until after commissioning the few families with (disabled) children would probably have a hard time convincing the majority of elderly people to spend money on playground facilities.

After having considered the landscape design, attention was again turned towards the table of saving alternatives (table 6.1.3.2), where the decisions were noted and approved.

Lastly, an evaluation of the process was conducted among the participants by means of anonymous questionnaires. The participants were asked to rank the process against each of the initial agreed process values on a scale of 1 to 10, where 10 was considered to be the best (see Table 6.1.3.3). The overall average was 9 with a variance of 0.85 which indicates great satisfaction among the participants (nine respondents). The lowest individual score given by any of the participants was 7.

In addition, a general evaluation was conducted where the participants were invited to give praise and suggest ‘opportunities for improvement’. Again the result was fairly positive (see Table 6.1.3.4). Lastly the process facilitator and client representative urged the contractor and architect representatives to perform a fourth workshop about integrated design and construction scheduling. They, on the other hand, seemed reluctant.

<table>
<thead>
<tr>
<th>Collaboration charter (process values)</th>
<th>average score 1-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>We will be trustworthy</td>
<td>9,33</td>
</tr>
<tr>
<td>We will respect each other – both personally and professionally</td>
<td>9,11</td>
</tr>
<tr>
<td>We will be loyal to the decisions made</td>
<td>9,13</td>
</tr>
<tr>
<td>We will be ready to make compromises where our initial personal interest needs to give way for other interests</td>
<td>9,00</td>
</tr>
<tr>
<td>We want good communication and we will make sure to inform all (relevant) participants on progress in matters</td>
<td>8,67</td>
</tr>
<tr>
<td>We will be constructive regarding changes and solutions</td>
<td>9,11</td>
</tr>
<tr>
<td>We will keep options open as long as possible (last responsible moment)</td>
<td>9,13</td>
</tr>
<tr>
<td>We will balance expectations and goals and use our resources rationally (no need to ask for CAD drawings if a sketch will provide the sufficient information)</td>
<td>8,67</td>
</tr>
<tr>
<td>We will work according to coordinated schedules and be respectful to other professionals operation</td>
<td>8,50</td>
</tr>
<tr>
<td>We will keep our agreements</td>
<td>9,13</td>
</tr>
</tbody>
</table>

Table 6.1.3.3: Process values

An overall observation was that the client representative played an important role in promoting the concept; he seemed enthusiastic about the workshop model and pos-
sessed the authority of an experienced professional. The popularity of the client representa-
tive was further supported in the interview data obtained subsequently.

<table>
<thead>
<tr>
<th>+ Advantages</th>
<th>Δ Opportunities for improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>The process has widened my horizon and understanding of values</td>
<td>It is a shame that the process had come so far (prior to the last round of workshops). If the design had not been so 'locked' beforehand it would have been better</td>
</tr>
<tr>
<td>It provides a good understanding regarding the overall project across each participants own interests.</td>
<td>If the process had started from scratch it would have been possible to 'struggle' more with the things, which might have resulted in more conflicts (and a less positive evaluation of process values)</td>
</tr>
<tr>
<td>It is nice to start on something you know is useful to the end-users/client (and which is better than the outset)</td>
<td>It may be worth considering when the workshop process should be initiated – it may depend on the experience of the participants.</td>
</tr>
<tr>
<td>All parties have been good at viewing the project with a holistic perspective that surpasses the traditional roles (everybody contributes). As an example, the architect is willing to consider bigger shafts and the contractor has provided creative design suggestions.</td>
<td>It is interesting that the design sequence can be different – you can start with an overall plan or look at the things behind the façade. Here we start by looking at the values in the end-situation in stead of considering how the structure should be dimensioned</td>
</tr>
<tr>
<td>It is cool as a consultant to have the contractor as sparring partner (in a forum that works). There has been good respect for each others' roles.</td>
<td>It would be beneficial to include representatives of the permitting authority. It would be nice with an advance dialog (which is actually a declaration of intent in the municipality)</td>
</tr>
<tr>
<td>The workshop has provided a good foundation for the subsequent process. It really does matter to sit together and talk with each other at a more general level with different perspectives.</td>
<td>It would have been nice if the galleries had been avoided from an operations perspective (but it provides better utilization of space). It is a matter of costs.</td>
</tr>
<tr>
<td>It does cost something to think thoroughly, but it results in good solutions – a lot is gained.</td>
<td></td>
</tr>
<tr>
<td>Knowledge of the other parties' values can be used in future projects</td>
<td></td>
</tr>
<tr>
<td>From an operation and maintenance perspective the time has been well spent.</td>
<td></td>
</tr>
<tr>
<td>Each meeting has resulted in something</td>
<td></td>
</tr>
<tr>
<td>It is nice to meet the team-members. It provides better knowledge of each other.</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.1.3.4: Evaluation of the workshop process
However, some critical observations were also noted during the three workshops:

- Several comments were made regarding the workshop model being very time consuming (each session lasted about 4–5 hours).
- Even though the client was very pleased with the changes being made, the architects expressed some annoyance about making the changes.
- The value tree was not rigorously used by the architects when presenting the design solutions. It seemed more like an ad-on explanation for some of the choices being made, rather than an integral part of the process.
- As may have been expected, the participants seemed much more comfortable discussing technical solutions than talking about value or values.

In addition, it turned out that the fourth workshop was never held. Retrospectively the consultants thought it was too late to perform such a workshop, while the contractor remembered it as if they just got ‘sucked into the work’.

**Interview data**

When conducting the interviews about 14 months later, it turned out that more changes had been made in order to ‘finance’ especially the upgraded ventilation system. Thus the wall covering had been changed to saw-dust wall paper and the façade brick had been changed to a cheaper brick (with a different colour). The result of the latter decision can be seen in Picture 6.1.3.1 (the social housing project is in the foreground).

The following section describes the (1) effects and (2) issues, which the practitioners highlighted in the interviews.

*Picture 6.1.3.1: Different facade bricks in the development area*
Effects of the workshop model

In the minds of the interviewees there was no doubt that the workshops had made an impact on the project. The client again stated that he was very pleased with the changes:

Client representative: Yes, we have one very concrete effect. We took some energy-saving initiatives in the project which had great consequences for other parts of the project, because we had to find savings that were equal to the extra cost associated with heat-recovery. And this is something that...is completely in line with overall policy and values in [name of client organization] regarding environmental concern and concerns about energy-consumption.

However, the architect was a bit annoyed with the saw-dust wall paper and facing brick:

Architect (1): Yes you could say, very concretely, the workshop resulted in we got a heat-recovery system and if you go out there today we have some cheap bricks and saw-dust wall-covering. In stead of it [giggles]. These were some of the savings we had to swallow because of this. [...] And I hope that the effect in the long run will show to be positive. In the short view it seemed a bit negative. Because we lost some of the qualities which we immediately thought were good.

The contractor representative thought that the workshops had provided the ‘space’ to really consider changes such as the heat-recovery system, which might otherwise have been rejected without much thought (cf. GJ). Likewise, the client representative, who had a background in the contractor business, stated:

Client representative: And if we had not had the workshop and worked on it in this forum, then...or not in front of the contractor drawn attention to the importance of this [...] that this was a value for us – that was maybe more significant than a brick, a specific type of brick, which were our point of departure. Then it might not have...then it was fairly certain that it had not been realized. [17.55]

However, the architects disagreed with the client and contractor: the changes could have happened in a normal design process:

Architect (2): there has been a very big process and that which you gained from it you might as well have gotten from some other normal type of design process - where we also end up with saw-dust wall-covering [giggles].
In addition, one of the landscape architects, who had worked on the case and did not attend the workshops, had not experienced any effects of the workshops – she had not noticed any difference to a normal project (cf. HJ). Also, the information (e.g. the value tree) was not passed on to the craftsmen on site (cf. GJ). However, the client and the relevant consultants were invited to speak with the craftsmen on site, when starting up a new process e.g. a rehearsal shaft (GJ).

With regard to the changes, which came out of the input from the municipality, the facility manager from the client organization said:

**Client facility manager:** I don’t think you had changed the apartments [if the workshop model had not been applied]. You would have constructed them and you would have ended up with some dwellings where the municipality afterwards would have come and said: This is not good. Because we see this happen again and again in other cases.

Likewise, the representative of the municipality (EL) had the experience that often times – in other projects – the professional consultants and builders did not (or were not able to) sufficiently consider the operation and end-user concerns (as they had done in this particular case).

As apparent from the above evaluation at the third workshop (Table 6.1.3.4), many of the interviewees highlighted the value of getting acquainted – to see the faces of the other parties. According to the interviewees, the workshops increased the level of communication; the face-to-face meetings made it easier to contact each other subsequently (cf. KN, EL and MF). Specifically Architect (2) said:

**Architect (2):** There have definitely been some positive effects. Also because of the understanding, from the people from the municipality [...]when they hear about all the difficulties that you encounter in just building the house, then it is not as easy to just say: you know there has to be leveled access and this has to be like this and this. They can see that: Okay it is a building that needs to be built. So everybody gets a better understanding for everybody. That is definitely positive.

Thus, according to the architect, the meetings provided some mutual understanding. In addition, the client’s facility manager highlighted the value of understanding the reasoning behind the resulting design:
KN: Well to me...operations wise...I experienced that I got a personal insight into how deep you go into details. This is not something I have experience before. Were we really are sitting and considering: we have these things, now we have to prioritize. If we take this, we cannot have this, if we take this...and I gained a lot from this. [...] Now when I, in the context of the dwelling part and the occupant democracy...then, given that I have participated in this, then I am able, in a department meeting, to say: this is the reason why the banister has not been painted, this is because we had only this much money and we would like you to have the heat-recovery or broad-band or something else. And I think that through this whole session, I became well equipped to pass this on; we have this budget and we have done our outmost to gain the most from it for your benefit.

Many interviewees emphasized the importance of knowing each other beforehand and the importance of personal capabilities and attitudes (human resources) of the participants (cf. GJ, MF, HL, CO, KN, JA) as well as the organizational set-up. It matters whether the client is a developer with a short-term perspective or an operation and maintenance organization that cares about the facility in commission. These were factors that the architects thought overshadowed the effect of the workshop model – it was a matter of having the right type of client and the right type of contractor and in this project they had been very good at creating a positive, open atmosphere without a sole focus on short-term profit:

Architect (1): They [the contractor representatives] are very open towards everybody. They don’t just sit and look at the numbers and say: no we can’t, this is too expensive, and this is not feasible. And this is the talk we are so used to from a lot of other [contractors].

[...]

Architect (2): it is actually just about openness [...] we can easily draw cheap solutions, we can easily draw everything. We just cannot...if it is always ‘no’ then we don’t have any room for maneuvering and then our professionalism might as well be pinioned, right? [...] then we also, to some extent, become defensive and say: well we might have seen some areas where they could also [save money]...but they haven’t noticed it...And then it becomes this “trench war”, where you really don’t bother to...why should you acquaint yourself with this...? To exert oneself, when all you get is ‘no’ in all other situations.

Architect (1): That is completely correct.

According to the architects, it had been a less positive experience in the earlier stages of the project, where a different contractor had been on board. At the same time, the archi-
Architects argued that these kinds of meetings might as well have taken place in a ‘normal’ design process:

*Architect (2):* If we imagined that this was not a turn-key contract, but a contract awarded on a trade-by-trade basis, where we could control everything from start to finish and where we had the customers…or those who were to use the building. Then we would call for such meetings. We would have user-meetings. This is also something that has been done before. Where you get everybody involved and talk about what kind of…that is a completely normal architectural design-process or work method. The problem is oftentimes that we cannot do this, because they are not present. And we don’t control it…today, right?

Thus, the architect acknowledged that because the workshop model had been mandatory, the contractor had been forced (by the client) to sit in a joint forum – this was perceived as a positive aspect. They also acknowledged that the external, independent process facilitator was a distinctive feature:

*Architect (2):* That is correct. We can never get that, when we have a stake in it.

*Architect (1):* No, that is probably the special thing about it…And this is something you initially need to get used to [giggles]. [name of process facilitator] who tries to act clever in relation to our house. [21.18]

In general, however, all interviews thought this second round of workshops had been a positive experience even though both consultant and contractor representatives had been somewhat reluctant at the outset [cf. GJ, JA, MF, CO]. As an example, the landscape architect stated:

*Landscape architect:* And we think that this workshop is…well we laugh a little bit of it beforehand, because now we have to go there and talk and spend a lot of time on this, but we also think it has been conducted very professionally.

As opposed to other social (partnering) events, the workshops resulted in something more concrete (cf. GJ and the evaluation in WS3, table 6.1.3.4) – it was not just an ‘event’: it was used for joint decision-making (cf. HL) and concerns were taken seriously (cf. GJ & MF). The practitioners applauded and highlighted the need to be concrete and solution-oriented. However, some critique and issues in relation to the subject matter were also indentified, which will be presented in the following section.
Issues identified in the case-study

The following section centre around three themes, which were identified (through the interview data) as problems to consider within the subject matter:

- The notion of value is abstract to practitioners
- Immediate financial concerns as a barrier
- Communication

Although this grouping is the outcome of an analysis, it is mainly used to structure the data presentation below (which subsequently resulted in the grouping). This is the reason for including this segment within the data-section of the chapter, although some analytic comments are provided.

The notion of value is abstract to practitioners

As it was initially sensed through observation, both the contractor representative and the architects had found the discussion of values a bit too abstract, equivocal and lofty:

Architect (2): I thought it was a bit too abstract. These values. Because...you know people are better able to understand it...if you ask: do you want a balcony of no balcony. And here these values can become a bit...well we would like to do a good job everybody, but we also want to get a hold of what it is really about and that is architecture. So this is where you get to...that you constantly talk about values...I thought it was a little bit...sometimes you spent a lot of time talking about this. 

[...]

Maybe it is just a matter of...if you had called it...now we are to talk about qualities...I know it is not the same as values, but on the other hand there has been so much value debate and these kinds of things, so it can become a bit too...soft. Where you said: now we need to figure out what types of qualities which are to be incorporated. We might have some emotional qualities, you could easily have, and we have some very practical and maintenance wise...and these kinds of things...a bit more...it is a construction project, right? That I could subscribe to...that is my personal opinion.

Researcher: The other thing becomes a bit to lofty?

Architect (2): Yes...and we say; we need to go through this before get to the substance of it. Then we have to go through this value...a bit wrapped up...so that NIRAS can also contribute in relation to their role. This is a bit how I think it turned out.
When I have been to these workshops, then I think: There are some books about value…management or something that you could read before conducting such a course which NIRAS did. And these have been read. And this is the experience you get […] but this had to be the thing that initiated everything. And you could also see that some of the general contractor representatives were cringing…[giggles] because it could become a bit too much.

The lofty character of partnering workshops was also highlighted by the landscape architect, who nevertheless thought that the workshops held in this project were at a much more ‘realistic’ level. To the question of whether the value-tree had been used, all consultants and contractor representatives answered unanimously ‘No’. The architects had actually forgotten about it and stated:

Architect (2): No, because a lot of these values…we have been injected with these values, actually, through our education and through the years we have been working…so they are on the back-spine

Shortly after he continued:

Architect (2): But this is again this thing about…we feel that we are artists, right? To some level, some more than others. And sometimes it can be art to just get the building water-tight, right? But…so if someone had written down the values in advance…well, in competition they would say…well they constantly try to find new values which could be important in relation to how society develops and these kinds of things. So as an architect you would say…and the customers…this is a limitation, right? We would like to just have a lump of clay. And then we will start shaping it and then all these things will emerge. And we are also very…very relaxed about this way of working. We are not afraid of sitting with a lump of clay and try to shape something and shape some values from this. Of course other groups of professions they need to have the questions then they are going to provide the answers. That is more of an engineering thing. So therefore I don’t think that we can imagine such a value-tree. If you are also going to be…an innovative architectural office.

[41.32]

However, it should be noted, that although the consultants and contractor representative suggested to cut down on the theorizing about value, the client representative suggested spending even more time on clarifying and aligning the participants perceptions of
value (and other central notions) and looking at things at a more overall level (instead of just talking about the few concrete changes in solutions).

**Immediate financial concerns as a barrier**

The time spent and the rework that came as a result of the workshops was, nevertheless, a problem to the architects and engineering consultants – to them it had not been a good project from an economical perspective. The architects also questioned the return on investment in workshops:

> Architect (2): a lot of time was spent on this. The question is whether you get the same value from it...in comparison to how many hours, where 20 people have attended some of the meetings, I think...or close to it. That is a lot of money.

Also, the contractor had not attaining the profit they had hoped for. The contractor representative stated that this was, to some extent, because the next project, in this development-area, had not started as planned and they had therefore not been able to continue their production flow as they had hoped for. This had, according to the landscape architect, led the contractor to adopt a ‘conventional’ attitude and squeeze the landscape architect to save money on materials:

> Landscape architect: So all in all I think it’s all very good, right? But it doesn’t really last when it then continues in the detailed design phase...these intentions and all these fine words about objectives. Then it becomes the hard economy which becomes the big brother and which dominates.

In this situation the landscape architect had sought support from the client:

> Landscape architect: Then we seek support from the client’s representative. So if we feel that we cannot really come through with some of these things, then we lean against the client and say: this you cannot be satisfied with. And they are not. But it should not be necessary when you have had all these workshops.

To the landscape architect, the situation was not unusual. Over and over again the landscape architect had experienced that a building project had become too expensive and savings were sought after in the ‘remaining’ part of the design – the landscaping. That this really annoyed the landscape architect is apparent in the following quote, where he comments on a suggestion made by a sub-contractor regarding use of a cheaper flagstone for pavement:
Landscape architect: then along comes some fop [sub-]contractor who are to lay flagstones and then it seems as if you are a complete idiot and then you have had a half or whole year long process with programming and workshops and then someone comes in and act up in a construction meeting and you also think...what? Have we forgotten the coherence, right? And this is not something the guy from the outside knows about, but he has been engaged, you could say, so...it is of course also a detail, but if we had just said: okay it sounds great, just lay this cheap flagstone, then you could that...programming and workshop and client wishes and coherence with all the rest it suddenly falls apart...

Accordingly, both the client representative and the architects stated that, in general, these types of ‘partnering sessions’ were often experienced as useless – they were a mere ‘play to the gallery’ where people subsequently went home and did what they had always done. Thus to the question: “How do you think the method will be received in the construction industry in general”, they answered:

Client representative: Well, there are many reflex-opinions about it being a bit abstract - especially in the contractor business. So it may be...It would probably be with some skepticism and a certain feeling of waste of time and...it can be like that.

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Architect (1): They would say: Oh no.
Architect (2): Yes [they would say:] Oh no.
Researcher: What is the risk? What are people afraid of?
Architect (1): That you just waste your time. That it will not result in anything, right?

In addition, the architect thought that some parties might not be motivated because of diverging interests:

Architect (2): Yes, and the turn-key contractor...the central idea for a turn-key contractor is...that he is in control. [54.51][...] he offers a fixed price to the client and then he would like to earn as much as possible.[...] ...but if he is able to see a value beyond...that they will actually get more customers, then it becomes interesting. And I think that this is where the main point is. And then you can conduct partnering or workshop and various things if you have gotten hold of this kind of type. Or if it's an architect, in the same way, which can
only see...that it can only be as I say. A real poseur – it would be just as dam-
aging. And some of those also exist.

Thus again the type of attitude or policy of the companies involved was highlighted by
the architects.

**Communication**

The complexity of communication was also considered to be an issue by some of the
interviewees. Thus, the representative of the municipality stated:

*Municipality representative: This is of course an experimental scheme and
there are some naïve parts, right? We talk about common values and common
expectations. And we can of course all agree that we should keep the budget
that we should honor our agreements and we should do a good job. And this is
also something you can between the client and the contractor. However, when
it comes down to it, then we probably understand the words differently, right?*

In addition, the architects pointed at the importance of having a person with authority,
who is able to retrieve the essence of things and follow it through. In connection to this,
he stated:

*Architect (1): Because otherwise it will only become talk. And then it will be
the one, who is best at expressing himself, [who] will be right [win]. And this is
not the intention.*

The second architect added that he actually thought that the process facilitator had taken
on that role successfully. This issue about rhetoric connects to a more broad issue about
communication. Thus, the facility manager, who had never been included this way be-
fore, had experienced some difficulty in understanding the rather codified expert lan-
guage (cf. chapter 4.3) that was sometimes used in the workshops:

*Facility manager: If you are not an academic or engineer or the like, then you
could be lost where some of us had to get a better understanding of what the
words meant. When you say this – I don’t know this word 100 percent. When
you invite people who are not academics, then you might want to remember
that not everybody immediately knows about the things that are being dis-
cussed. So if I were to criticize something then it would be to make sure to ex-
plain the things to the people who are not at an academic level, so they are
able to keep up. Sometimes I thought this was missing*
In addition, the landscape architect pointed at the limitation of the intended openness:

*Landscape architect: When we present things in workshops then we also make sure that...we do not tell everything. Because we haven’t solved everything. And we are not going to bind ourselves by explaining a detail, which we might be unsure of. So this is also a part of the whole game. That we explain what we think is decisive and which they can make up their minds about and which is important and so on, but we do not go into details because nobody is served by that in this stage. So we are ourselves part of controlling the information and the reaction we would like to have...the response we would like to have on these different things. And I think that this works well, seen from our perspective.*

These quotes will be analysed and reflected upon below.

### 6.1.4 Analysis

**Hermeneutic inspired interpretation**

**Source criticism and reflections on effects and problems**

Within a source critical lens (cf. chapter 2.4.1), the minutes of the meetings are to be considered as remnants of the meetings taking place, but more or less narrating sources of what took place (although it was the researcher who wrote the minutes of the meetings and they were approved subsequently by the participants). Nonetheless, the value-tree, the partnering charter and the changes which were decided on, can be seen as rather concrete facts. Thus it is certain that it was decided to incorporate injection air, heat-recovery and enlarge the bed and bath-rooms. Together with the subsequent visit at the site (and the picture taken), it is likewise certain that the facing brick had been changed. Whether this would not have happened *without* the workshops is speculation. Here the researcher relies on the informants, who state their opinions based on experience.

In connection to this, criticism of bias may be considered; what can have distorted the interviewees’ opinions? Regarding the ‘effects’, the architects supported the workshop concept, but at the same time they stated that the changes could easily have occurred in a normal design process; they did not consider this to be novel – they often did something similar (when the conditions were right). Thus, as will be substantiated below, the architects seemed a bit defensive and their statements may have been affected by the fact that it was their traditional role, as interpreter of client value, which in this case was
partly overtaken by an external consultant ("something you initially need to get used to"), who furthermore chaired a debate and scrutiny of ‘their’ design. On the other hand, those who said that the workshops definitely had an effect may have been biased by their own interest in describing it as a success. Hence the contractor company subsequently branded itself by having participated in this new management scheme. This is apparent in a press release from the 3rd of June 2009, where the contractor representative describes the project as a lean project and “a textbook example of collaboration”. Nonetheless it is difficult to see what bias the representative of the municipality might have had in supporting the concept – at least he had no economical incentive for promoting the workshop model. He was simply pleased to be included so that the building, in his opinion, was attuned to better serve the needs of ‘his’ end-users. Nonetheless, although the end-product may have ended up in the same way without the workshop model, all participants thought it had been some good meetings and they appreciated the personal relations that had been established (e.g. with the municipality representatives). This is an important prerequisite for effective communication (Emmitt & Gorse, 2007; see theory chapter 4.3). Specifically, the facility manager felt better equipped in explaining to the users the trade-offs and solutions that had been decided on in the process. This is an effect in itself. However, researcher-bias in relation to this presentation is of course obvious in that the researcher is employed by NIRAS. This is a condition of the research.

Concerning the problems highlighted by the participants, the same description of bias may apply. Thus, again it was mostly the architects who were critical. In addition, the landscape architect seemed to use the interview opportunity to draw attention to a more general problem that he had experienced several times and therefore he may have exaggerated the extent of the problem in this specific case (see the contractors comment to the analysis after the summary).

Regarding criticism of distance, the interview data is rather weak for describing what specifically happened in the workshops, because the interviews were conducted over a year after the workshops. However, seen as a supplement to the observations and minutes of the meetings they are useful. For example, the architects’ statement about not using the value-tree corresponds with the initial observation, that the value-tree seemed to be used as an ad-on explanation. However, as the client representative suggested in the interview, some of its contents may unconsciously have been stored in the minds of the participants. Accordingly, the contractor representative stated:

Contractor representative: I think it [the workshop model] makes my work easier...because I feel that I am like 99% certain about what is important to the client. So a small simple thing...when the plumber or somebody else asks:
should we mount the pipe here or here or where should be put the measuring device? Then I know what is most important to him. It is not as much a matter of saving two meters of piping, but that you can access things and be able to repair them or whatever it may be.

However, the contractor representative also stated that the client had engaged himself to a great extent in the subsequent process during site construction. This may have been an overriding factor in the creation of mutual understanding – something which the contractor representative might (mistakenly) have ascribed to the workshop model retrospectively.

Nonetheless, the time gap provided the opportunity to investigate potential longer lasting effects of the workshops – thus it could be tested whether the changes and the intentions for collaboration had been preserved. Accordingly, as it turned out, interesting developments had taken place in relation to both design (the yellow facing brick) and collaborative atmosphere (if we are to believe the landscape architect).

Concerning criticism of dependence, there is no reason to question the interviewees’ statements in general – they all participated in the workshops (except for one of the landscape architects). All in all, with the above reflections in mind, it seems to the researcher that the workshop model did have an effect; the client and representatives of the municipality spoke in a forum where all participants gained an insight of what was important to the client and end-users, which spurred concrete changes in design that clearly reflected these “product values”. In any case, the client’s chief representative, the client’s facility manager and the representative of the municipality thought it had an effect and were pleased with the result – this alone is an effect. By the same token, the client representative stated:

*Client representative: Now we must wait and see whether it actually will result in hard-core energy reduction, if any. But this is at least to us a clear signal, on which we profile ourselves. So in this way it has added value.*

Regarding the problems that were described by the participants, it could easily lead to over-theorizing to look for any underlying pattern or meaning (other than the categorization already made). That the facility manager thought that the discussions sometimes became too esoteric is what it is – the researcher also found it hard to keep up when writing the minutes. That communication can be difficult and distorted is also a fact. That short-term financial concerns will sometimes tempt the participants to compromise client value (e.g. suggest a poor flagstone) is also trivial. However, in this case the landscape architect may have exaggerated the problem in order to ‘publish’ a more general
concern. That the notion of value is abstract and difficult to speak of is also, to the researcher, a fact. However, when taking a closer look at the transcriptions the attention to this apparent problem also seems to contain another issue. Thus, to the question of whether it would help to get paid for the time spent in workshops, the architects replied that this would help, but then added:

*Architect (2): if you get paid to attend these meetings, but the meetings are too long and lofty, then we will also say this. So, although we got paid, but we thought it was stupid then we would still say: shouldn’t you do something else?*

Seen in connection with the above statements, about having many of the values “on the back-spine” and referring to the value discussion as a ‘lecture’, the architects implied: we know what is relevant, don’t come here and tell us about some lofty theory you have read out of a book – or as one of the architects more specifically said: “we want to get a hold of what it is really about and that is architecture”. This led the architect to speak of how they preferred to develop architecture; as the artist working with a lump of clay from which “all these things will emerge”. As the architect stated above, they felt constrained by any predetermined client “product values” – they probably already knew these and would like to discover something beyond this statement. This connects to Schön’s description of ‘back-talk’, where new preferences are discovered in the (reflective) design process. In addition, as described in chapter 4.2, Lawson (2006:182) argued that designers are generally more solution oriented24, because the problem cannot be comprehensively stated. Thus, the architects felt not only constrained, but also alienated by the discussion of values. It was not just a matter of wasting time, it was something more fundamental: it was a matter of design rationality – as the architect said: “this is more an engineering thing”.

The above discussion connects to the pre-understanding that values may change as part of design development (this was before writing chapter 4.1 and 4.2). This pre-understanding was specifically ‘tested’ in the interviews. Here the chief client representative, the facility manager and the representative of the municipality all answered ‘No’ to the question of whether their perception of the most important values had changed. This was also the experience of the process facilitator in general. However, as more information became available and the possibilities unfolded, the chief client representative had changed his mind as to what solutions would best satisfy company values:

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24 Meaning they tend to generate a lot of solutions to explore the problem (as oppose to analyse information extensively and make a single ‘best’ solution). However, Kruger & Cross (2006) somewhat opposes this. They found that although some designers are indeed solution oriented, others tend to focus more on the problem and relevant information (before making any solutions). See chapter 4.2 for further details.
Researcher: Did you change your perception of what were the most important values during the process?

Client representative: No, not generally seen. Not at all. But I would say that there were a few components in the project which we together found as useful in order to achieve the overall value, which we would like to represent.

Researcher: So the solutions to the same [problem] changed during the process.

Client representative: Yes. I am of the opinion that…we have worked to include heat-recovery in earlier projects, but this has always been refurbishment projects. And this is much harder. But the way I remember the process, it was something which was first thought of as a possibility at this point [during the workshops] and we of course know that it is expensive, so we had to find savings in various places and it was not until the contractor came on to the playing field and estimated some of the heavy stuff, as for example the façade brick, that the possibility became real within our budget.

Likewise, the contractor representative did not experience that the client suddenly changed his mind about things, but the consequences of making the changes for the elderly people were more widespread than initially anticipated. The above quote connects to the understanding of values as something rather constant, while value judgements or preferences are shifter; a person’s frame of reference changes when new information (of possible solutions) becomes available (see chapter 4.1 & 4.2). Thus, it was obvious how the information, brought to the table by the new municipality representatives, spurred changes in design – not because of a change in priority of values, but because the participants knowledge of the needs of the end-users had deepened.

In relation to whether it had been difficult for the client representatives to express their values, the facility manager stated that he did not find it easy. However, he thought the brainstorm helped him to become more clarified about his values. This is to some extent in opposition to his earlier statement about not changing his perception of values. On the other hand, one may maintain a rather fixed set of values, but find it difficult to express them. Accordingly, as described in chapter 4.1, individuals may through reflection gain ‘cognitive support’ for the values they (intuitively) uphold.

All in all these findings suggest a change of meaning – at least to the author. Initially the author thought of the workshop model as an instrument of briefing, where the primary aim was to educate the consultants and contractors about client values, so client values could be ‘incorporated’ into the product and thereby enhance client satisfaction. However, the workshop model seems more to be an instrument of sensemaking to the client – so that the client-conglomerate (the different owner representatives and municipality representatives) could take ownership of the design and feel they managed to achieve what they believed was best for the users.
pality representatives) becomes more clarified about their values, relevant product qualities, available solutions and consequences. This enables the client to make decisions, which is critical to the process. In addition, it helps the client to understand the product he receives (if I want this I can’t have this) and the many considerations and trade-offs that have been made in accomplishing it. Thus, the value tree is more to the benefit of the client than the professionals (they did not use it), although they may learn something from the conversation as well (if they pay attention).

How did participants' value-perceptions manifest?

It seems rather clear to the researcher that the “product values” presented by the client and municipality representatives, were in fact taken into account when developing the design. These “product values” – which in the terminology of chapter 4.1 should be denoted qualities – centred on functionality, sustainability and easy maintenance. These qualities could easily be found in the changes that were made to the design e.g. heat-recovery, larger wheel-chair turning diameter etc. Thus the client’s perception of value did in fact manifest in concrete design changes. However, it was also obvious that the other participants made value-laden attempts to influence the design – they were not mere ‘servants’ of the client. Accordingly, the architects said that they had to ‘swallow’ the saw-dust wall paper and the cheaper façade brick – they were clearly not pleased with this for aesthetical reasons. At the other end of the spectrum the contractor representative stated his main concern:

Contractor representative: I feel that we at [name of contractor] try to really influence the project so you create something which is buildable.

Perceptions of value were also displayed in the landscape architect’s descriptions of his struggles with the contractor – where he ‘fought’ for coherence and took the client as ‘hostage’ when the cheap flagstone was considered.

Thus a tentative conclusion is that the participants’ perceptions of value were manifested in the very suggestions put forward by the participants (e.g. cheap flagstone, expensive facing brick) as well as the derived discussions over alternatives.

Interpretation inspired by critical theory

The consultants and contractor were, as described above, initially reluctant to engage in the workshop process, but they were contractually forced to do it. Their concerns have been described above, which revolved around the risk of wasting time and money. In addition, the architects imagined that the turn-key contractor (and any eccentric archi-
tect) would be reluctant because of the risk of loosing control (this is however speculation). Nonetheless, all parties stated that they would be motivated to do it again – they were somewhat surprised about the positive experience. The consultants appreciated how the contractor had been ‘forced’ to adopt a broader focus than cost. They were pleased that the various suggestions and concerns, from each of the different parties, were taken seriously in a joint forum and not just rejected with a mere glance at the budget. In addition, they were pleased that the representatives of the municipality got an insight into the complexities of designing – so they would be less prone to make unreasonable claims. The contractor representative stated that it was a way to ensure buildability – he perceived his role as a blockage against ‘wild ideas’ (cf. GJ, p. 6) – and it was nice to know that the users would be happy about the product. He also thought it speeded up subsequent decision-making because he had a clear understanding of the client values. The landscape architect likewise saw it as an opportunity to learn about the users (and design a better product), but also an occasion to make a promise about not bullying anybody – they were, however, sceptical of whether this would ever work. Thus, although consultants and contractor representatives expressed a genuine interest in improving the product by learning about user and client needs, they also thought, individually, it could help restraining the other parties from becoming too extreme in their endeavour (e.g. having a short sighted cost-focus, making unreasonable authority claims, having ideas that were too wild, not bullying anybody). Thus within a critical theoretical perspective, one may supplement the conformist view of the workshops, as a means for collaboration and learning about client value, with an alternative view where the workshops are perceived as a way to restrain the self-interest of the various participants.

However, the picture may be turned around once more: As argued in the methodology chapter, the workshops may also be understood as a way to discipline the client by holding him responsible for any early statements about what is of value. The client representatives were, consequently, asked if they perceived this as a risk. The chief client representative acknowledged this concern, but it was something that had to be dealt with in a “collaborative atmosphere” (cf. p. 53). In addition, he would prefer this over the conventional alternative:

> We have seen so many bad projects as a result of the traditional separation; where the designers design and we say yes in particular phases and then they start to build and then it is not what...this has resulted in so many bad things and I guess [...] that these things have emerged as an attempt to escape these locked situations. We will always maintain the parties...formal responsibility;

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25 Although the contractor representative at the same time thought that the consultants were a bit slow to decide on things because they thought they needed to ask the client about everything
the designers’ are not to make design errors or omissions and the contractors have to construct the project etc. Nobody should shirk this responsibility and the client should not shirk from his decisions or programme or what ever forms the basis for initiating the project. But there are many interpretations in between, until it has become a finished building.

Likewise, the client’s facility manager acknowledged the problem and emphasized the need to collaborate. Again, he stated, that it was a matter of the people involved and whether they respected the “process values” (organizational values):

Facility manager: Because I would obviously say: well I might have come up with an idea on the fly and now you have taken this and made drawings and say that things will be half a million more expensive. But this is not the way we agreed that we were going to work together in the workshop.

Thus, both of the client representatives acknowledged the risk, but thought it could be solved through ‘decent behaviour’. This is in line with the earlier interpretation provided in the methodology chapter, where the “process values” are seen as a means of control through socialization.

Within the critical theory perspective, one may also consider the impact of contractual bonds (power relationships) that may be used to repress participants although they are to participate in what appears to be a collaborative and open forum. Here the obvious example would be the landscape architect’s account of how the contractor had squeezed him while at the same time celebrating the project (in a press-release) as a text-book example of collaboration. Likewise, one could imagine that such power-relations might inhibit sub-contractors and sub-consultants ‘free speech’ in workshops. However, this did not seem to be the case when observing the workshops. Of course this is very difficult to observe and the landscape architect was therefore asked directly:

Researcher: When you participate in such a forum, do you then feel restrained by this power-relation?
Landscape architect: No.
Researcher: You don’t?
Landscape architect: No.
Researcher: You state your opinion about things?
Landscape architect: Yes. But of course when it comes to...when we are asked to do something and change the contours for example, then we are employed by them, right? Then we have to say: well it is not going to look nicer, if you do this, but this is the message, right? And then we have our client as a backing-
group, you could say, but um...not in the workshop. And I don’t think that this was our achievement, it is just as much [name of contractor]’s achievement...or everybody who participated. And this is also something one should praise [name of contractor] for; that they prepared the ground for an openness and debate and almost anything is possible and we should make the best possible and so on. And it is also because of this, that we think that it was disappointing because we had thought that this time it would have been a bit different.

The latter part referred to his disappointment about being squeezed in the end. The above quote does, however, not rule out the possibility that hierarchical contract relations can be a problem. According to the consultants, the turn-key contractor, in this case, acted differently than most other contractors – at least in the workshops. In this forum, where the client and other important people were present, the “process values” worked. However, they only worked for as long as the project seemed profitable. In the end, when the contractor had an overview of expenses, the landscape design could be sacrificed to ensure profit – the landscape architect was a small player anyway. On the other hand, because communication had been established between the landscape architect and the client, the landscape architect could use the client as ‘hostage’ – thus the workshop model ‘worked’ in this respect to restrain the contractor from pursuing self-interest.

Finally, within this perspective, one may consider the notion of distorted communication. The landscape architect described how they, when presenting their design, are tactical in what they present and try to control the response. He spoke of this as a “game”. Of course, as the landscape architect explained, this may be a matter of not bothering the other participants with immature ideas (this observation is also made by Winch 2008 in relation to the Johari window described in chapter 4.3). However, in connection to this, one may (again) draw attention to the use of the value-tree as an ad-on explanation for the design. Although the design actually seemed to reflect the value-tree, it had not been used. This indicates the possible manipulative character of information that may be presented in these types of workshops, even if all participants on the surface support the ideal of ‘openness’ (within the societal norms, it is not acceptable to oppose this). If one wants to pursue the ideal of undistorted communication it places specific demands on the participants and particularly the process facilitator to critically assess any statements and maybe more importantly any exclusion of information. Otherwise, as stated by the architects, it will just “be the one, who is best at expressing himself, [who] will be right”. The interpretation aligns with the common act of persuasion highlighted in the social process view of designing (cf. chapter 4.2).
Interpretation inspired by postmodernism

In the methodology chapter it was suggested that the notion of client value may be a ‘discursive trap’ that hinders consideration of other legitimate interests. This led the researcher to consider a counter-image: should buildings necessary fit their immediate end-user? Would it make sense to speak of over-customization? This notion, over-customization, was elaborated on by the landscape architect:

*Landscape architect*: This is also something we struggle with and against. Here we see [name of client representative] as a person who can see into the future. But if it is some care-personnel for senior housing then they might not have the same…the same capabilities of looking forwardly as…if they then stop being employed within half a year then somebody else comes along with some special wish, right? Then we think it is our task to…ensure that there are solutions which also work if other types of personal come along. So if something like this emerges in such workshops then we try to stop it…the very special wishes.

Accordingly, since types of users are likely to change during the life-span of a building, a designer may want to think beyond the immediate end-user. This is, however, not a novel insight – the notion of design for adaptability/flexibility is old news in design management literature (cf. chapter 5.2). However, in this specific project, the representative of the municipality and client’s facility manager were fairly certain about the type of end-users that would occupy the dwellings for the years to come. If the demand for these kinds of dwellings decreased, it would be more likely, according to the facility manager, to renew other buildings in the area, which were not as modern as those recently constructed. Nonetheless, adaptability was reduced when constructing a house with relatively small apartments, with large bathrooms and small kitchens, separated with concrete walls. In addition, when speaking of over-customization, the cheap yellow facing brick will, from the point of view of the neighbours, be noticeable for the entire life-span of the buildings. However, one of the architects provided another interpretation, which seems more novel to the researcher and which fits even better within the postmodern perspective:

*Architect (1)*: you can think of it in this way. Also that...it is our...our way of constructing houses has become so impoverished, you could say, therefore we have to have these kinds of workshops where we talk about these values that we don’t really have the money for incorporating. It is also a bit like this. Now we sit in a factory building, build in 1890’ise...um could we be sitting in something from the 1990’ise in a hundred years? I don’t think so. It would be demolished much earlier. You could really make quality at that time...
Thus, workshops like these, could be viewed as a “play to the gallery”, which was performed to legitimize buildings that, in the context of history, stands out as poor quality. However, the participants are not able to see this, because the talk about client value ‘works’ as a rational explanation for the design (although nobody really looked at the value-tree). The comfort of knowing that there is a rational explanation becomes the main criteria e.g. the value of being able to explain trade-offs, which is highlighted by the client’s facility manager. The solutions, such as good indoor climate and heat-recovery, which may be considered as obligatory in a modern (rich) society, is suddenly labelled as added value, because the point of departure was really poor.

Postmodernist are also concerned with the role-frames that are ‘evoked’ in different settings. Since role-frames may be associated with specific values (which may structure perceptions of value), this is also worth considering within this analysis.

At first site, however, it did not seem as if any role-frames were changed. In fact the traditional roles seemed very robust: in the interviews the contractor representative saw himself as guardian of buildability and cost, while the architects spoke of artistic development, aesthetics and coherence. At the same time the architects dissociated themselves from the contractor business, which they, in most other cases, thought had a narrow sighted cost-focus. Accordingly, to the question of whether they had adopted a different role than usual, the interviewees said unanimously ‘No’. In addition, it seemed rather obvious, from the interview quotes and the observations, that the different participants’ perceptions of value were very much steered by conventional values associated with their profession. One of the architects stated this very clearly:

   Architect (1): I also think it is difficult to objectively relate to the notion [value]. Because we are all colored by what we are and we of course focus on architectural values, but through and through we focus on that it is something which can last and is to delight of those who use it.

However, as opposed to seeing the participants as ‘structured’ by their profession, one could adopt a more actor-oriented (strategic choice) ontology, and argue that the participants perception of value manifested in their ‘choice’ of role-frame as architect, engineer etc.

When considering role-frames, it is also (again) noteworthy that the architects seemed a bit defensive when arguing that the changes, which occurred in workshops, might as well have come-out of a ‘normal’ design process and if they, the architects, had been in control, they would also have conducted user meetings (if the conditions were right).
This may be an indication of the pressure, which these workshops, led by management consultants, may impose on the classic role of the architect as leader of design. Thus, both the architects and the landscape architects seemed to have a somewhat critical attitude towards management ‘talk’. The architects saw themselves as the persons with the insider’s knowledge and overview as opposed to the external consultant – “who tries to act clever in relation to our house”. Likewise, in relation to the final decision of keeping the balconies, one of the architects said:

Architect (2): But again you could say: it could have happened [omitting the balconies], but everybody was none the less included and could object. This shows maybe that we had actually made a design that was okay…in relation to…this is also what we have been educated to be able to do…

This last bit, where the architect felt he had to prove that his design was okay, again seems defensive and may imply that the workshops can be perceived as an examination of the consultants (something which is a known problem within the literature of value engineering cf. chapter 5.3.4). Thus, although the architects seemed to approve of the ‘independent’ process facilitator, their statements may be interpreted as a sign of a hidden conflict that connects to the process facilitators ‘interfering’ in the design process. Thus, from the above statements, it is evident that the architects prefer a lump of clay – not some predetermined qualities. These are seen as a hindrance – we know these qualities, we want to create something beyond this (to be innovative). This can be interpreted as the talk of a person who perceives himself as an expert. Likewise, in the above discussion of over-customization, the landscape architect viewed himself as capable of determining narrow-sighted and far-sighted users and clients. Thus the architects may end up in a hyper-reality, where they, through their identity as professional architects, become purely self-referential in their creative unfolding of value. This accusation was tested in the interview:

Researcher: But the way I interpret what you say, then you sit and feel as experts beyond what a client can make a list of. And you would like to unfold your own creativity and experience and expert knowledge in this project. Is that…is that to put words in your mouth?

Architect (2): Yes…well it starts to sound negative that…that we feel limited by it, because it is not [negative]. We just cannot settle with this. We would like to participate in it. But of course in areas we feel superior [giggles] Where we are of the opinion that we…if you attend this meeting we think we have a field over here, which we cannot explain, but the same goes for the engineer. If he
had the time he could explain it. Sometimes it doesn’t even help us to have more time. We still cannot explain what we do, right?


This quote (together with the earlier presented quotes) seems to indicate that the architects prefer the self-image of an artist (not expert), who cannot rationally explain the process of creation. In addition the architects highlighted the conformity of contemporary design, which they felt imprisoned by:

Architect (2): But actually it could be exciting to live in a completely different way. Cohabitation and all this from 70′ies there was something completely different. It has become very conform, actually. And we might have wanted to talk about completely different things than you can in such a workshop. So sometimes we can have our thoughts in a different place, because we think there are some very exciting things which we would like to discuss with each other and spend some time on, which we never arrive at […].…well we say dwellings and nobody has said exceptional special dwellings, but just dwellings, then we know what a dwelling is. Not to say that we have standard projects, but we do have…there are schemes for how to…should the staircase be in or out…if the house is tall then we need an airlock, right? There is a pattern in it.

Accordingly, within the tight budget of a social housing project, long discussions over client value may seem paradoxical; at least to an ‘artist’ because it is actually very little that can be done out of the ordinary. Seen from the outside, it is also hard to tell that these buildings have been created through an innovative management approach in which client value was at the centre of attention. But this is how the story goes and that is the main thing.

6.1.5 Summary
This case study shows how the workshop process gave rise to design changes which derived from the discussion of client and end-user “product values”. To accommodate the ecological policy of the client and the elderly and/or disabled end-users, the changes included: an up-graded ventilation system with injection air and heat-recovery, larger bath and bed-rooms and the deletion of the weather-porch. However, in order to keep the budget, savings were mainly accomplished by: reducing the basement, changing the type of façade brick, changing the type of wall covering, reducing the amount of wardrobes and changing French balconies to large windows. All which were considered to be less important to the users and client. Most of the interviewees thought that these changes would not have occurred in a ‘normal’ design process. Another positive effect
was that especially the facility manager felt more equipped to speak to the users subsequently and explain the reasons for the chosen solutions. However, some issues were also identified by the interviewees, which mainly revolved around; the theorizing about value as a bit abstract and waste of time to practitioners (nobody used the value-tree), the codified technical language which was not understandable to all participants in the workshops and the cost focus which, apparently, led the contractor to squeeze the landscape architect in the end.

Subsequent analysis via source criticism pointed at the possible bias that may have affected the interview accounts. Thus the landscape architect may have used the researcher to ‘publish’ a more general concern by exaggerating the problem of short-sited cost focus and the consequential bullying of the landscape architect. In addition the architects may have been biased by the fact that the workshop model entails a process facilitator who ‘meddles’ with the design process, which they would like to control. Further analysis also pointed at a conflict in design-rationality. This led to a discussion of whether the client’s values had changed during the process and consequently whether it makes sense to base the design on predetermined “product values” (qualities). According to the interviewees, their values had not changed. This was also the general experience of the process facilitator. The contractor also confirmed that the client had been consistent in this respect. However, the client representative had found that his perception of what solutions that were possible and that best served these values had changed. Thus to the client the process involved learning and clarification. In addition, the consequences of some of the design changes were more widespread than initially anticipated. This aligns well with the understanding of values as being rather constant, while perception of value may change as information becomes available and the frame-of-reference is widened.

In relation to the question of how perceptions of value manifest, it seemed quite clear that in this project the client’s perception of value actually did manifest through the design (changes). In addition, from the interview quotes and the observations, it seemed that the different parties were very much steered by conventional values associated with their profession. They were not mere servants of the client. Thus the contractor highlighted the need for buildability and the architects spoke of coherence and (lack of) aesthetics. Perceptions of value were manifested in the very suggestions put forward by the participants as well as the derived discussions over alternatives (e.g. the change of facing brick).

Reflections, inspired by critical theory, suggested that the workshop model could be seen as a way to discipline and control the self-interest of the various participants through socialization. Also, it was discussed whether contractual bonds might repress
sub-consultants/contractors underneath the surface of the ‘collaborative’ process. This did not seem to have been the case while the workshops were taking place, but it was noteworthy how the contractor subsequently had, according to the landscape architect, squeezed the sub-consultant, while in a press release celebrating the project as a textbook example of collaboration. Furthermore the potentially manipulative character of the participants’ presentation of information was highlighted.

The postmodern perspective led to a consideration of whether focus on (immediate) user-value was desirable e.g. the risk of over-customization. The analysis also suggested that the architect’s identity as an artist may conflict with the structure of this approach. Furthermore, the process may seem as a play to the gallery in the light of the tight budget, which did not leave much room for anything out of the ordinary. Consequently, it was suggested that the workshop model may work as a scheme to legitimize something that, from a distance, may seem as poor and conform buildings. Thus its main effect was that it provided a sense of rationality to the participants for the solutions that were chosen – these were labelled as added value within the narrative constructed through the workshop model. The postmodern perspective also provided an alternative answer to the first research questions: perceptions of value may manifest in the ‘choosing’ of role-frames.

The table below summarizes the interpretations for this case-study:

<table>
<thead>
<tr>
<th>Research questions</th>
<th>Hermeneutics</th>
<th>Critical theory</th>
<th>Postmodernism</th>
</tr>
</thead>
<tbody>
<tr>
<td>How did the participants’ perception of value manifest? (RQ 1)</td>
<td>• Explicit through discussion of value</td>
<td>• Through their ‘chosen’ role frames</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Implicitly through their core focus areas, suggestions and arguments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What are the effects, which the participants associate with the application of the workshop model? (RQ 2)</td>
<td>• More ‘serious’ consideration of alternatives, which led to design changes</td>
<td>• Control of behavior through socialization</td>
<td>• The workshop as a narrative to create legitimacy</td>
</tr>
<tr>
<td></td>
<td>• Improved understanding of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Possibilities/Consequences</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Other participants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What issues can be identified in relation to management of client value creation? (RQ 2)</td>
<td>• Over-theorizing</td>
<td>• Unable to (completely) hinder repression of subs</td>
<td>• May be perceived as an examination of the consultants</td>
</tr>
<tr>
<td></td>
<td>• Engineering rationality</td>
<td>• Tactical, distorted presentation of information</td>
<td>• May cloud the participants view e.g. of conformity</td>
</tr>
<tr>
<td></td>
<td>• Time-consuming</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Codified technical language</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6.1.5.1: Summary of case-study answers to research questions
Lastly, it is important to include a critical comment to the analysis, which was provided by one of the contractor representatives. It connects to the accusation of sub-optimization in relation to the landscape project:

“After having read the case-study analysis, I am left with a negative impression regarding our role in relation to the collaboration with the landscape architect. It is correct that savings have been made in the landscape design in order to ensure compliance with the allocated cost for landscaping in the bid/budget. However, in connection to this, I would like to clarify that the changes have been reviewed and approved by the client, on a continuous basis, as we were aware that the landscaping design exceeded the budget in its initial form. It is common practice to suggest alternatives (e.g. flagstones) in order to keep the project viable. It has been an open dialog between client, contractor and landscape architect. I can of course, the same way that the architect is disappointed about the facade-brick, understand that the landscape architect feels somewhat neglected, but again it is not uncommon to perform a round of savings/optimizations in a project.” [Authors translation]
6.2 Case 2: University office and nursery building

6.2.1 Case description

The scope of this project was design and construction of a new university office and education building. The building was to be placed partly on the university campus, which was (is) owned by a real estate administrator who leased the buildings to the university. The purpose was to provide new facilities that could physically unify the department of economics, which had otherwise been scattered around in various locations outside campus. In addition, the plan was to incorporate auditoriums in the basement which could be used as common facilities across departments. Next to the new building, the department of economics was also moving into an old (historic) building that, however, needed some refurbishment first (this is referred to as building 26). Furthermore, because the university had already given their notice in relation to their existing facilities they were, as long as construction took place, going to occupy some rooms in a building adjacent to building 26, which was referred to as building 25. The real estate administrator took care of most of the work in relation to the refurbishment, but the architects provided some services in relation to planning and authority matters. However, focus in the case-study is delimited to the new building project (although it is inter-
linked with the other plans). To realize these plans, the new building had to absorb an existing nursery that was partly located on the planned building site. This part of the building site was not owned by the real-estate administrator, but by the municipality. Thus, the plan was to buy the (rest of the) building site, temporary re-house the nursery, demolish the existing buildings and incorporate a new nursery into the university building (and provide a new playground).

The central parties involved in this project were: the real-estate administrator (the client), the architectural consultancy company, who was the main consultant that had hired two sub-consultants; the landscape architect and the engineering consultant. The architects had been selected by the client without any competition. The relationship had been established on previous assignments, which also included preserved buildings. Other parties were: the university user-representatives, the campus administration and a number of public authorities; the City-architect’s office, The Children and Youth Administration, The Copenhagen Energy Supply and – because of the historic site – The Cultural Heritage Centre and The City Museum.

**Case-study relevance**

The researcher gained access to the case-study project via the PhD industry partner that was engineering sub-consultant on the project. The approach to this case-study was straightforward in relation to the overall methodology. Thus the purpose was to observe how the different participants’ perceptions of value were expressed in the very early stage of the design process and specifically how the client and user’s interests were articulated and managed as well as any issues that aroused in relation to this.

**6.2.2 Data collection and case-study research questions**

The data collection included participant observation of:

- 2 user-meetings between the architects and university user-representatives (one was an excursion to a newly build university building)
- 1 user-meeting at the university, where staff from the entire department as well as students attended
- 5 design-group meetings, where the consultants met (bi-weekly) at the architects’ office to follow up on the latest developments in the project
- 5 client-meetings where all consultants met (bi-weekly) with the client representatives at the architects’ office to follow up on the latest developments in the project
- 1 meeting at the city-architect’s office, where the architects and the client met with the city-architect and case-officers
1 meeting between the consultants specifically about the possible application of the workshop model.

These 15 meetings took place in a period where the last part of the programming was completed and the outline proposal (conceptual design) was developed. After the outline proposal the project came to a halt for more than a year and so the data collection stopped on the threshold of the design development stage. Thirteen of these meetings were sound-recorded (the first user-meeting and design-group meeting were not recorded) and transcribed subsequently. Together with the written notes, which were taken at each meeting, the data thus amounted to 172 pages. Also, the researcher had access to various project documents such as minutes of meetings, estimation sheets, programming (brief) documents etc. Excerpts of these notes and transcriptions will be presented in chronological narrative (Maaløe, 2002) followed by the analysis of this specific case-study. The quotes have primarily been selected according to the protocol described in the methodology chapter. This includes:

<table>
<thead>
<tr>
<th>Protocol for observation</th>
<th>Research question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Instances of direct expressions of values</td>
<td>RQ1</td>
</tr>
<tr>
<td>2. Instances of argumentation for specific design solutions</td>
<td>RQ1</td>
</tr>
<tr>
<td>3. Instances of considering and/or performing design changes</td>
<td>RQ1</td>
</tr>
<tr>
<td>4. Instances of (apparently) opposing interest/value conflicts and how they are managed</td>
<td>RQ1/RQ2</td>
</tr>
<tr>
<td>5. Instances where participants express frustration or uncertainty about the appropriate way to proceed</td>
<td>RQ1/RQ2</td>
</tr>
</tbody>
</table>

Table 6.1.2.1: Protocol for observation and selection of quotes

A few interpretations are made concurrently with the description, which provides some initial cues for the subsequent analysis.

6.2.3 Data

Excursion to newly build university building 19th of November 2008

The excursion included 5 user-representatives representing the department and campus administration, 4 architects, a guide and the researcher. The guided tour was through a newly build university building “Kilen” (part of Copenhagen Business School) that has become renowned for its architecture (see picture).
What seemed interesting to the researcher, during this tour, was how the users, unlike the architects, were unimpressed with the design. Instead, the user-representatives directed their attention to everyday functionality. Thus the themes that were discussed were noted to be the following: Sizes of auditoriums, daylight, risk of theft, area disposition, conditions for disabled people, wireless network, rooms without doors, glass walls (privacy), open and closed office spaces, access-ways and access restrictions (for students), centralistic control vs. local control, use and functionality of rooms in general.

Specifically the group talked about user-behaviour as opposed to architectural intentions. Thus, in relation to an issue about posting things on the walls, the tour-guide said:

Tour guide: “We are not allowed to do that according to the architect”

Symptomatic of this discussion about functionality, one of the user-representatives looked at a (small) cell-office with glass walls and asked:

User-representative: “Where do we place our books?”

Some of the user-representatives were also concerned about (private) office-space for supervising students.

After the tour the participants had a meeting where the architects presented their latest plans for disposition of space and functionalities. In the discussions that followed, the user-representatives clearly tried to be mindful about what other users had said about their needs and wants – they tried to recollect the input and often referred to what other people would think of various suggestions. On the other hand, the architects referred to what the city-architectural office would think of various suggestions. In this way some of the discussions seemed to rely heavily on the (supposed) opinions of people, who were not present (but this is of course to some extent natural when having user-
representatives). Specifically the users had a strong wish to be co-located in the old refurbished building. The new adjacent building would then include common education facilities, café, faculty club and nursery etc. However, according to the architects this was not possible, which was illustrated with a presentation of two alternatives; one where they had tried to locate (squeeze) everybody into building 25 and another where they had located one (of four) research unit in the new building. The latter was what they recommended to the user-representatives. This lead to a discussion of whether it was possible to have a bridge between the two buildings to ease everyday access between offices/research-units? The architects turned this suggestion down with reference to the district plan and the need to preserve the historic building – the authorities would not allow it. In relation to this, one of the user-representatives replied:

User-representative: “We ought to try it out with the permitting agency – this way we can document [to the other users] that we have tried”
Architect: “This will open up to a whole new public hearing process about the district plan”

Thus the architect implied that if they tried out this suggestion with the authorities it would overthrow the schedule. However, the whole disposition of space and functionalities also relied on the specific number of staff, administrative personal, students etc. Apparently the user-representatives had changed the number three times and they were still uncertain about how many people the architects should design for:

Architect: “We need the most qualified guess”.
User-representative: “Well that is no better than a wild guess”

After the user-meeting the architects talked about the comments they had received from the user-representatives during the guided tour. The architects had noticed that the users thought that the raw concrete walls were depressing. Accordingly, after the next client meeting (the 25th of November) the project manager from the architectural company said:

Architect (PM): “they didn’t even like ‘Kilen’ when we showed it to them. They got depressed by the concrete”

Engineering consultant: “And the lighting…?”

Architect (PM): “And the lighting – can you believe it? They got depressed and we just wanted to show them the coolest building in the whole city…they didn’t think so”
Design-group meeting and sketch session 19th of November 2008

The next meeting, between the consultants, was mostly about the design of the basement in the new building (including the auditoriums). Emphasis was specifically on (1) indoor climate/energy-consumption (sustainability) and (2) interface with the outdoor surroundings (access-ways to auditoriums from surrounding buildings). In relation to the first item, the architects were looking for overall guidelines from the engineers. Regarding the latter, a separate ‘sketch-session’ was held at the end of the meeting between the landscape architects and the leading architects. During the meeting the schedule was discussed and it came up that the architects needed a month more as a ‘buffer’ because the nursery user-group had not been established yet – this turned out to be a recurring issue on the subsequent meetings. In the sketch session, the discussion took place while simultaneously sketching on transparent paper that was placed over existing drawings. It was apparent how the architects worked with multiple solution alternatives for internal problem solving. At one point the landscape architect suddenly recalled that there was an existing water-pipe, described in the district plan, which crossed across the site (in the ground) and would clash with the planned location of the auditoriums. They agreed that the exact location of the pipe and its function had to be checked by the consulting engineers and they could not proceed before this was clarified.

Client and design-group meeting 24th of November 2008

The bi-weekly meeting, where the client and consultants met to go through the latest developments in the project, started with a discussion about the nursery user-group. The project manager (architect) stated:

Architect (PM): “To make a connection between time-schedule and budget, we are now at time where we had thought that the briefing phase would be finalized. It is not and that is because of the nursery...um...and we can’t really know when...before we have planned a process with the people assigned to participate from the municipality. We still need some names...”

The chief client-representative stated that he just recently had received some names of case-officers, working in the Children’s and Youth administration, which the architects could contact about the matter. The next step would be to appoint a user-group that represented the nursery. However, they (the land surveyor and geo-technical engineers) were still not allowed to enter the site because the nursery users knew nothing about the plans. The client representative explained that, although the client organization intended to provide pavilions, the lack of corporation from the Children’s and Youth administration was due to a concern about expenses associated with the temporary re-housing.
Next the project manager (architect) commented on the other user-process with the university representatives, where the architects were hoping to ‘freeze’ the brief/programme:

Architect (PM): “We are almost done with the programming of the university part of it and we are going to have a user-meeting on Wednesday, where we expect to be able to ‘shut out’ everything that might come from them. Now they have had the things for discussion and back and forth so many times that we believe that we have now determined what ought to be the right [solution], right?”

However, she then informed about the ongoing discussion about co-location (that came up on the last user-meeting) and the uncertainty regarding the specific quantities of staff and students:

[7.18] Architect (PM): …then we went home [after the last user-meeting] and waited with anticipation the new numbers that they would provide and then they gave us new quantities that were even higher [laughter]. So now we have promised to make a diagram for them that shows how much can actually be contained in building 26. Revise this one based on the latest information we have, because they also need to show their support base, that they have done everything they could to assemble everybody in one building.

The uncertainty about the lay-out of the new building connected to the plans for the refurbishment of building 26 – plans which the client would like to realize as soon as possible. However, they hoped that the lay-out of the university part of the building would be settled before the upcoming user-meeting. They talked about how to get going with the refurbishment in relation to the relevant authority permissions (from the urban design centre and cultural heritage centre).

The consulting engineer then brought to attention that a central-heating station (based on steam) was located on site. In addition, the engineer informed about the old underground water-pipes. These were topics for further investigation. In continuation of this, the architect in charge (not the PM) suggested to work out a general risk-assessment of the project. He resumed the above mentioned issues: The nursery user-process, the authorities processing schedule, the underground water-pipes and the heating station.

**Airborne exhaust particles at the nursery playground**

However, another issue was soon added to the list in relation to the planned location of the nursery playground. Pollution of nursery playgrounds with airborne particles that
come from car exhaust were apparently a ‘hot’ political topic and a professor from the university was a leading figure in raising the issue within the public debate. The location of both the existing and future playground was relatively close to the road and so the landscape architect had looked into the matter. It turned out that the municipality had no requirements or recommendations regarding distance to roads. However, the landscape architect commented:

Landscape architect: there may be a couple of people who brings it up because it is a hot political subject. [...] there may be someone who says: Now that you are building a new one [playground], then it would be stupid to locate it close to [the road]. So maybe it should be brought up on a meeting with the users...it is a bit difficult, right?

One of the client’s regular advisors had also looked into the matter (from a technical point of view) and he had heard that the small particles would quickly grow to a size where they are harmless - they would not be able to get into the bloodstream (“they only get stuck in lung tissue and other places”). Without considering this project, he had some time ago initiated an investigation (conducted by a specialist company) in a different location on campus and suggested to await the results. To this the project executive replied:

Architect (project executive): But when you are a parent to a child in the nursery, then it is bad enough if the particles can get into your body – no matter where they end up

Architect (PM): Is it then possible to have children in Copenhagen? [36.06]

The client asked what the consequence would be of moving the playground so it complied with the recommendations given in the public debate (50 meters from the road). This would mean that the playground had to be located on top of the auditoriums – something the university users would disapprove of. Thus the project executive tried to frame the issue to the client:

Project executive: “as client, we must consider: do we restrict ourselves to the statutory requirements or will we try to do things a little bit better? Because if we want to do things a little bit better, then this location will probably not work. Then there will be two other possibilities. One is to move the playground and nursery institution on top of the auditoriums and change everything [later he rephrased it as “going back to Adam and Eve”] or return to the old discussion, which died in its infancy, which is to move to building 26. And it is now [this decision needs to made]…if we consider the overall disposition.”
They agreed that the latter option of trying to persuade the University to have the nursery in building 26 would be unfeasible. The landscape architect made a remark about the difficulty in choosing who to indulge and the PM commented that this was why it would have been nice to talk to the user-groups jointly. The client representative then tried to make a decision:

Client representative: *We must adopt the viewpoint that we have the perception...that it needs to be located in this position. We must hold on to this and then we must see where it goes politically. I think if we start giving in...then they will really take hold of it...*

However, the landscape architect then asked whether other measures, such as fences or vegetation, could dampen the risk of harmful particles. After some discussion they then agreed on conducting an investigation based on the following question:

Client representative: *There must be somebody who knows about this stuff who can say: if we are at a 50 meters distance and there is nothing in between...then its legal or then some experts say that it's okay - how much vegetation and fence is needed, if we are at a 20 meters distance, to accomplish the same damping of particles?*

Architect (PM): *Yes, how can we improve the condition? But it is something we do out of good will; it is not a legal requirement.*

They talked a bit more about the subject and questioned whether the 50 meters was just some number that one person had suggested – after all it was all brand new research. They agreed that if somebody brought up the issue, it would be powerful to have done the investigation.

**Design-group meeting the 2nd of December 2008**

The purpose of this meeting was primarily to discuss various scenarios for soil investigations in relation to geo-technical matters and the handling of (potentially) polluted soil. Two architects and two engineering consultants attended the meeting. The meeting was mostly concerned with technical issues and understanding the regulation regarding this matter. The challenge was to lay out a strategy for soil investigations, which would probably change when they gradually learned more about the soil conditions. Also, the authorities would have different requirements depending on the circumstance for each specific building project. Thus it mostly came down to the ‘rules of thumb’ or experience, which the engineers had developed on other projects regarding the most cost-
effective strategy. In addition, the investigations depended on a permit from the Children and Youth administration to access the site. Furthermore, because of the history of the plot, the city museum would need to approve all plans. This led them to speak about the underground water-pipes. It seemed that there were two water-pipelines, but nobody knew who owned them (the municipality thought it was the Copenhagen Energy Supply, but they thought it belonged to the municipality).

**User-meeting 3rd of December 2008**

This meeting was arranged with the purpose of discussing the plans and presentation for the up-coming large user meeting, where staff and students etc. from the whole department were invited to a briefing about the project. The architects had prepared a presentation that aimed to tell the story about the process up until this point and the rational basis for the design as it had evolved. Thus the presenting architect said:

Architect: “A short story about our process with [our] analysis of the area, studies of volume and the struggle to get as many square meters as possible, which we show with these model-photos and a part of the district plan, which we have reduced to something more understandable here, where we have these boundaries, which are not to be moved and those which we have been able to negotiate...implying that they now are fixed. [...] And one of the conclusions is that it will be difficult to get a connection between the two buildings, because this is one of the boundaries, which we cannot violate and which the cultural heritage centre will...um....oppose.”

Architect (PM): “It is not only the cultural heritage centre....it is a district plan...it would violate the district plan.”

Shortly after the presenting architect continued:

Architect: “We will make a comment that this...of course...is not something that we have put together on our own. So, there will be pictures of our visit to [name of the existing department buildings], from one of our workshops and finally some pictures from our new building 26. Then there are more [slides] about the process and story about how we have tried to organize department of economics, so we co-locate all research units within building 26...we include the whole study to show that it is not possible and in this way substantiate that it is not possible. And in this way provide reasons for dividing people in the old and the new building”.
In connection to this, they included the slide shown below, which lists the conclusions ('wish list') from the initial user-workshop.

**CONCLUSIONS FROM THE SNEKKERSTEN SEMINARIUM**

- More social interaction
- More academic interaction
- More common spaces
- Research based clusters
- Flexibility in room allocation
- Centralised study administration
- Department gathered in one building
- Mix of research personnel, PhD. Stud, TAP, Research Stud.
- Common lunchroom
- More student - teacher interaction
- Proximity of seminar rooms

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**Figure 6.2.3.1: Excerpt of user-information meeting presentation:**  
The ‘wish list’ from the first user-seminar

The next part of the presentation illustrated that they had tried to fit everyone into one building, but it was not possible. They listed the pros and cons regarding an initial attempt of fitting everybody (four units) into building 26 and the current conceptual design where three units were co-located (see slides below).

Subsequently the presentation showed how the department in its current facilities was much more scattered. So even though the department could not be completely co-located, the new design was a great improvement. Afterwards they talked about the transition phase where some of the users would have temporary offices in building 25. The user-representatives had not seen the plans for this arrangement and would like to comment on the specifics at the end of the meeting (this turned out to be a good idea).

Then they turned to the subject of introductory speakers. A user-representative stated:

**User-representative:** “I intent to emphasize two things: It has been necessary for us to make some decisions...and this is something that the faculty had to accept – this was the way the process had to be, right? – and then the schedule has changed so that we will arrive at a normal state much faster. Then I would like to say something about the faculty aspects and....”
Architect (PM): “I think it is important to say that this proposal is what we have arrived at and the proposal in its entirety is not for debate, but they can of course give input regarding smaller things that they would like to change…”

Arrangement with 3 units in Building 26

Figure 6.2.3.2: Excerpt of user-information meeting presentation: The two scenarios of 3 or 4 research units in building 26
A user-representative then (again) brought up the subject of the bridge between the two buildings. The PM interrupted:

Architect (PM) [interrupts]: “When we present it on this slide, then we say that the only reason for including it is that you expressed very clearly that you wished to have this gangway. The physical connection, which we unfortunately have had to reject because of the district plan and how dangerous an exercise it would be to try [to get a dispensation]”

User-representative (continues): “Yes, but one could say that…now we have approval to construct this building, then nobody can hinder one asking…to be allowed to have an access-way…”

Architect (PM): “Afterwards…”

User-representative: “Afterwards…and then it would be nice if the building was arranged in such a manner that it would be meaningful to build the access-way…so that the levels fit and [...]...because I think it would be silly to preclude this possibility [...]”

Presenting architect: “We could of course mention this [...]”

User-representative: “Yes, so that we can tell them honestly and sincerely that it is not something which is precluded, but it is something which…”

Architect (PM) [interrupts]: “It will overthrow the entire project right now”

One of the user-representatives asked about the detail of the plan-drawings. The architect replied:

Architect (PM) [41,48]: “Right now it is also important to focus on the creation of ownership to the solution...the overall solution we have chosen. We must be careful that people don’t say: I’m going to sit here and then a month later we come up with a different proposal and then they say: why?”

User-representative: “Well, I don’t think that people will say: this is where I’m going to sit. But they would like an overall impression...the entirety. If you see a furnished hallway then you understand…”

Accordingly, the architects and user-representatives were very mindful about how and what they communicated to the users.

At the end of the meeting everybody went to the back of the room to look at the preliminary plan-drawings for the temporary relocation in building 25. The plans turned
out to be a surprise to the users. Based on information from the client, the architects thought that more space was available, than what had been agreed/negotiated with the campus-administration. Accordingly, one of the user-representatives stated that just because the client had not leased the facilities to someone else, it did not mean that the university would lease it. Then they talked about the implications of having less space and whether they could build arguments to convince the campus administration to lease the extra area. However, they were still a bit uncertain about the number of occupants. Nonetheless, it was agreed that the architects should hurry on making new plans to fit everybody into the reduced space – the plans needed to be ready before the user-information meeting.

**Client and design-group meeting the 8th of December 2008**

Initially, the chief client-representative informed that up until now they were still unable to engage the Children and Youth administration in a constructive dialog, but he had spoken to some of his ‘contacts’ who had arranged a meeting today in order to move the process forward. He stated that he could not see what their problem was, since they got a brand new nursery and playground at almost the exact same location and the client would furthermore pay for the pavilions in the intermediate period. The designers should therefore move on with full speed based on the presumption that everything would work out. Until communication had been established with a user-group, the consultants should base their design on a standard programme for a nursery. The PM commented that it was crazy that the nursery stakeholders precluded themselves from influence. They agreed that a ‘cat flap’ should be left open. Furthermore, the client representative would like a schedule update together with a (previously planned) estimate update. On the initiative of the engineering consultant, this estimate should reflect a risk-assessment on both prices and quantities. However, although the message was to move on with full speed, they still awaited permission to enter the site. This was a real barrier in relation to plot investigations.

The PM then informed that the issue about building 25, in relation to the intermediate relocation of the university users, had been solved. The client could start refurbishment of building 25, but regarding building 26 they had to wait for approval from the Cultural Heritage Centre. Next they spoke of the issue about airborne particles. The client representative stated that for now they would wait and see because it could stir up too many things if someone started making measurements on the playground. Also, the way they saw it, the playground would be located at the exact same location as it had always been. The client’s advisor stated that the values they had logged at a different location on campus were just below the limit and so they would hypothetically be allowed to build a nursery on this location. In addition, this other site was presumably worse than
the location on which the nursery was currently placed. The client representative stated that he thought that this was a valid argument to start with. The PM concluded that they would wait and see if the user-group was actually going to bring up the subject. The PM then informed that she and the client had received an email from the city museum who announced their interest in the project. This was considered to be bad news because the city museum could really interfere with the schedule if they chose to do so.

Next the issue about underground pipes was addressed. The engineering consultant had gathered more information about the pipes and the conclusion was that there were no technical problems in relation to solving this issue. However, the interest of the city museum was probably related to one of the pipes, which actually was a roofed trench that had been out of commission for a long time. The other pipe supplied a nearby public lake, but the ownership was still unresolved. Regarding the district heating station, it had now been decided by the Copenhagen Energy Supply that it could be decommissioned. Lastly they talked about the approval process in relation to the cultural heritage centre.

User-information meeting 9th of December 2008
The user-information meeting was arranged in an auditorium at the university with about 100 attendees. As the second speaker (after the head of department), the vice-dean, who had also attended the user-group meetings, spoke (in English):

Vice-dean (user-representative): So, what should be in the new building? There were certain restrictions the local authorities in Copenhagen insist that was to be a kindergarten in the new building. Because where it is supposed to build there is today a kindergarten and the local authorities never close a kindergarten. So that is one precondition. Then from the faculty we had certain purposes that we need to be satisfied and that is mainly three larger auditoriums. [...] two other seminar, teaching rooms for 60 or 90 people. These are needs that have to be met in order for teaching to be able to take place at the [name of faculty] from 2011 and onwards. Then there has to be a faculty club. That’s not a decision of the faculty but more the university. Um...there has to be some facilities for students to have a coffee a few other teaching rooms and other things...conference facilities. But all that was pretty much planned in detail. So that’s...what should be in the new building for department of economics was not settled or planned in advance. So that was the difficult part of the plan. So the next step was that [...] [name of architectural company] made a plan not only strictly for the new building, but for building 26 and the new building seen together. Because otherwise it could not be decided what should be in the new
building. So [name of the architectural company] has in fact been working with a full plan with (building) 26 and the new building [8.50][and] of course obeyed...as good as possible the principles that we decided at Snekkestern...um...

[...] The faculty of social science and the department here had to accept the process involving hard decisions. Otherwise the whole...it wouldn’t be possible for another year. And one of these decisions would be one decision concerning how the [??] that divide the department of economics between building 26 and the new building. Um...this is of course a very [tough??] decision and I would say...[...] I think from the best of my knowledge that the best solution has been found...

The architect soon after began their presentation that was very similar to that which had been presented at the user-group meeting the 3rd of December 2008 (see above). When the slide with the users’ requests came up (figure 6.2.3.1: the user wish-list) the architect (PM) said (in English):

[37.17] Architect (PM): “All in all we think that this does actually agree with quite a lot of the wishes you had from the Snekkesten seminar. We do achieve more social and academic interaction and we do achieve these common spaces that you asked for. Also we [??] flexibility. We centralize the [??] administration at the bottom of building 26. We have the mix of research personnel, PhD, technical administrative and research assistants that you asked for. [??] creating these units...um...also I think we have created a situation where the interaction between teacher and students will be quite [??] and [??] very close to offices and still spread out...so...[??] pretty much what you wished for. [38.28]

The vice-dean then brought up the subject of the bridge between the two buildings. He stressed that they had fought for this solutions, but it was simply not feasible at the current stage. However, they had not given up on the idea – it just had to be a separate project that would come subsequent to the construction of the new building. Then someone from the audience asked:

Someone from the audience: “What is wrong with getting an underground connection? An underground bridge?”

This idea was turned down by the architects and the vice-dean partly because of the expenses associated with such a solution and partly because the vice-dean could not see
the benefit of going through the basement, when he wanted to access the other building. However it was again stressed that the bridge had not been ‘killed’ – it was on the ‘list’.

After the presentation the head of department commented on the transition phase which would probably involve some inconvenience, but the important thing was to look for solutions and keep focus on the improved conditions which followed. He then asked for questions from the audience. The first question was:

Someone from the audience: “Just to remind you, we already discussed that with the [??] just to remind you in the process that you need a number of auditoriums and teaching rooms with blackboards. Not only whiteboards, but blackboards.”

The head of department stated that this was on the ‘list’. Then someone asked about the sharing of offices in the permanent situation. The architect referred to the plan drawings which they could all have a look at after the meeting. Someone from the audience then asked about the extent of noise during construction:

Someone in the audience: “It would look to me as if there is not [going] to be that much discussion right now, but I have one question about the two years interim...some of us have tried to sit in offices where construction is going on just outside the window…”

The inquirer was informed that it would indeed become noisy, but only in a relatively short period of time where the ground was prepared for the basement. Shortly after, the formal meeting ended and the attendees went to have a look at the posters (plan drawings) in the back of the auditorium and ask informal questions about the project.

**Meeting about user-process/application of workshop model 17th of December 2008**

The purpose of this meeting was to assess the possibility of applying the workshop model (described in the introduction) as a way to facilitate the user-process. The meeting included the two leading architects (the PM and the project executive), the project manager from the engineering consultancy and his colleague who had participated in developing the concept. The engineering consultant (the co-inventor) explained the history and idea of the workshop model. The architects seemed interested and mostly asked about the specific practices in relation to various parts of the concept (how to decide on the participants, when to include the contractor, how to prioritize values etc).

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26 He was also the initiator of the present research project and the facilitator in the previous case-study
The PM specifically asked about how to handle changing needs – or needs that get more clarified in the process. The consultant acknowledged this concern, but stated that in his experience, the values do not change very much – the researchers would like to sit in peace and the children would like to play outside. This would not change. In continuation of this, the PM stated:

Architect (PM): “What we did in this project, was to...because they talk a lot about their cell offices - the professors. It is very important to them that they sit in their closed box and so on...and then we showed them “Kilen” [see user-meeting 19th of November] and thought we might be able to soften the closed box in some way. We must be able to throw in some glass or something.”

Engineering consultant: “No”.

Architect (PM): “No way! So what we thought of as a closed box where you still got a bit of light into it and you could still see a little bit of what is going on. They weren’t there at all. And we wouldn’t have understood this if we hadn’t shown it to them. Then we might have thought that the task had been solved by...that there was a screen, which might as well be transparent.”

Engineering consultant: “So their need was actually not only to be separated, but [to] visible be by themselves?”

Architect (PM): “It was not only a matter of noise”.

This illustrates how the architects had tried to influence the users’ preferences, but instead learned more about their needs. They talked about the concept in general and the difficult task of conveying the meaning (real consequences) of abstract drawings. Then, after a while, they returned to the specific case. They agreed that the main challenge was to bring the nursery user-group up to speed with the university user-group (before having a joint workshop). They discussed the possibility of going through the same process with the nursery-users, as they had already been through with the university user-group. However, the process had to be discussed with the client and coupled with the overall budget. In addition the project executive stated that in a joint workshop it would be a good idea to include public authority-representatives, so the users could be directly confronted with the constraints that they would impose. In order to speed up the process the project executive also suggested working out a proposal for a value-tree and a critique of their current design as a point of departure for a joint workshop. The urgency is expressed in the following quote:

Architect (Project executive): “But we need our client in on it, because things need to go really, really fast. Our client is sitting at the edge of his chair and would really like to get material submitted for district plan [revision].”
The project executive agreed and said he would advise the client to initiate the next phase:

Architect (PM): “You want them to buy the project proposal before the outline proposal has been reviewed?”

Architect (Project executive): “Yes…because they are interested in this in order to get a building permit the same day as the district plan is approved. Then you take a risk in asking the designers and consultants to proceed with design.”

They agreed that for this reason it was vital to include the authorities to ensure that the proposal would not be turned down in the district plan approval process. Accordingly, the emphasis from the architects’ side regarding the assumed opinion of the authorities, when for example discussing the possibility of a bridge between the new building and building 26, should be viewed in the context of this strategy. At the end of the meeting they spoke about the costs associated with the workshops and how to explain to the client the benefit of doing it anyway.

Meeting with City-architect 15th of January 2009

This meeting was arranged to present the current conceptual design to the city-architect and district plan case-officers in order to get informal feed-back prior to the submittal for district plan approval. The district plan was to be revised and in order for the project to move forward, there needed to be accordance between the revision (intentions of the city-architect) and the plans for construction. Thus, the architects would in their submittal provide input to the district plan revision, which the case-officers would – to the extent they liked the input – incorporate in their revision, which would then lead to the approval of the project. However, it was solely the case-officers/city-architect who (within a political context) decided what to write in the plan and so the architects (and client and users) could avoid a lot of inconvenience if any discrepancies could be dealt with beforehand. The attendees were the researcher, the (chief) client-representative, the architects (the project executive and PM), case-officers (from the Urban Design Centre) and the city-architect.

After an introductory round the project executive stated that there had been some developments since their last meeting (in December). However, he would initially outline the (architectural) analyses that laid the ground for the design (developments):

Project Executive: “And what these analyses really point at as a main conclusion in relation to building pattern is you have this strict core in it and then
you have a building structure around it which behave a bit differently and here you can do stuff a bit more freely, than you can close to the original lay-out…”

In the same way the landscape architect continued to talk about the gardens:

Landscape architect: “…in principle you could say that it is a big box with boxes in where you have some primary spaces with small spaces in them and where you can always relate to the primary spaces…and this is very characteristic for…”

As they explained their ideas, the architects turned over the pages in a booklet, which presented the conceptual design. As an illustrative example of how design development may be described, the quote below is included:

Landscape architect: “…the basement function to a large extent was connected to the function of the house. […] You went through the house to get to the basement and via the basement to the garden space…and you could then move from the garden space via a secondary staircase...

Case-worker: There was a logistic explanation for the gardens, right?

Landscape architect: That which has been added subsequently is a programme change…which is…is that you actually speak about a house which holds three functions: the basement function is a function that connects to the whole of the university…the [name of the university] campus […]

This means that the function of the basement does not relate to the rest of the house…but the whole garden. And this provides a significant change in that the whole flow to this garden and the whole flow to the basement…stem from the rest of the university […]

And this has resulted in the geometry which you see here on the table…now. It solves both the arrival issue, but also…we think…creates a relatively dynamic space. And […] we still work with the principle of having spaces in spaces…as with the [rest of the] university.

The landscape architect added that they were still uncertain about how to shape some of the walls and they needed to model it in more detail to “see” what was best. The city-architect was quite pleased with the design, but also made the following comment:

City-architect: “that which I would appeal to…and what we need to have, now you ask so directly, we need this…what we can be fond of…where is that which
we can be fond of in this drawing? Landscape-wise [...] We need some kind of amenity value...

Specifically the city-architect commented on the sky-lights to the auditoriums, which he thought was arranged “as an engineer would have done it”. He would like to have a sketch idea of the amenity value.

They continued to talk about the gardens for a while. Then they turned their attention to the building; the project executive presented two alternatives that differed in their roofing material. One alternative had the same material on the roof as it did on the façade (bricks). The project executive explained:

Architect (project executive): “What we want is to hold on to is the principal shape of the roof. We would like to be able to work with and still move some of the points...in the future phases...it is something about how precise does it need to be in relation to the district plan...we are a bit uncertain regarding this...we don’t want to make a traditional saddle roof...at the other extreme...we would like something like this. And then we would like to hold on to brick and we would like to work with these bands. And that is actually period with regard to the constraints that we would like to have...but this is something that you need to say...how far [you] would like us to proceed.”

In addition, the architects would like to expand the building with two meters in one direction, which crossed a boundary in the (current) district plan. Although one case-officer agreed that this was in fact a violation they had to consider, the city-architect approved of this suggestion – he thought it would look nicer. Shortly after the city-architect continued:

City-architect: If we are to talk about the architecture and all this...then I have a feeling that your ambition and abilities do not entirely correspond to each other. And when I say abilities I do not mean architectural abilities...what I mean is that you may not have enough money. I promise you that this is expensive. It is extremely expensive. And every time we have a project...at least in the time period where I have been in the municipality...it has become...no matter how wealthy the client is...to do this trick where you have a brick roof together with an equivalent brick façade without eaves and eaves gutter and all this. Lastly it was [name of architect] who burned her fingers on this...[...] and then I would like to add that I think it is an incredible refined way of interpreting the historic national romanticism, which to me is a nausea kind of architecture, I can understand that we need to preserve it – the cultural heritage
centre and everything – but I think it is almost a joke how refined you interpret it…it is so beautiful

The city-architect added that he was open-minded to various types of roofing materials. To him the challenge was the technical side of things:

City-architect: Can you solve it technically? That is to me the success-criteria for all of this. All these skylights can probably be made watertight and I think the façade…If you can afford it…I think it is really nice. But I don’t mind that you return with a more regular brick wall if the costs are becoming a problem. Clay-tile façade…I think we will say no to…because it always gets a light character…and then you might as well do it in bricks.

After having talked about hiding technical components in the roof and requirements for sustainability, the project executive returned to the matter of detail/constraints in the district plan submittal; how open-ended could the text be formulated? The city-architect stated that it could be fairly open-ended (e.g. without choosing a specific material for the roof, colours etc.). At the same time he (again) made a comment on how expensive the roof would be. After having agreed the process henceforward, the meeting ended.

Client and design-group meeting 26th of January 2009

This recurring client and design-group meeting included (beside the researcher) three client representatives, two architects, an engineering consultant and the landscape architect. The first item on the agenda was financial matters to which the chief client-representative spoke:

Client-representative (chief): “I also called you the day after our last design meeting and was a little bit concerned about the financial matters. And it should be seen within the context that we just before Christmas had a budget of 142 million and a risk of something…I don’t remember what is was…and then fourteen days after it had increased with 20 million and the risk has increased 2-3 percent as well.

The client developed his point further and said that the way the project was heading it would most likely be too expensive for the university. In addition, the company would not get the return on investment they were hoping for. The project manager asked if the client then could set a maximum cost. The client representative replied that they had to await the university’s response. In addition, they did not know the cost of the plot and various other things (charges for connecting to supply lines, re-housing etc.). In connec-
tion to this, they spoke about various uncertainties associated with the latest estimate update and the architects stated that they would use the rest of the week to scrutinize the estimate – the current number was also higher than they had expected. The client agreed that they needed a target to steer from. They ended the discussion with an agreement about examining the estimate one more time.

Next they talked about the meeting with the city architect. They were happy about the flexibility they seemed to have in relation to materials. In connection to this the client said that he had spoken to their in-house brick-layer. He had said that the façade would be two-and-a-half as expensive as a normal brick façade. The architects agreed. The client then added, that he thought that the option of changing the brick should be added in the district plan proposal. They discussed whether the city architect had implied that this would feasible – the project manager did not remember this. However, shortly after they returned to the issue about the nursery. A client representative had talked to someone from within the public administration and said:

Client representative: “It seemed like everything has come to nothing and it is the year of election and they can sense this because everything gets stopped, but she promised to follow up and give us notice as soon as she…”

Architect (PM): “But this means that she still doesn’t believe that we can get access to the site?”

Client representative: “Well, no – it didn’t sound like it…at least not for the moment”

They tried to count backwards from the day they would like construction to commence to figure out the deadline for having access to the site. One of the client representatives was sceptical about the current plan; she thought it might be unrealistic because of the political process. In addition, another stakeholder, the Nature Protection Board of Appeal, had an objection respite for a very long time. However, the client representative would talk with someone who might be able to “pull some strings”. Likewise, the chief client-representative suggested:

Client representative (chief) “I think we should use the university to be the ones to put pressure on…and they are pretty good at that, I have heard.”

Architect (PM): “They are well connected?”

Client representative (chief): “Yes…okay, you have a job to do”

Client representative: “Yes”
Afterwards they discussed what type of procurement to adopt. Then they spoke about parking spaces. There were some statutory requirements about a certain number of parking spaces when constructing buildings of this size and function. However, the university did not want any parking spaces:

Client-representative: “Well the university has at an earlier occasion stated that the thing about parking spaces they would be able to completely remove from the district plan…we would not be required to do anything…and we must hold them to this.”

They concluded that they would examine the amount of existing parking spaces and try to substantiate that these were not being used. Then they would approach the case-officers with these numbers. Furthermore the client representative would ask the university to confirm their earlier statement. The landscape architect should go on assuming that no parking spaces should be made. Next they discussed the level of detail in the district plan submittal. The landscape architect said:

Landscape architect: “It is a matter of how open we do it, right?”

Client-representative: “Because if everything gets turned upside down and it exceeds the budget then it may be something like that that gets removed…auditoriums in the basement.”

Architect (PM): “Then you will not get the university to move in…but yes” [laughs]

Client-representative (chief): “No I don’t think so…”

[28.47] Architect (PM): “I think that this is their greatest need…the auditoriums”

This turned out to be a real issue on the following meetings. However, this meeting continued with a briefing from the architects about a meeting with the Cultural Heritage Centre, where they had tried to prepare the agency for the drawings they would receive (as in the meeting with the city-architect). The project manager was a bit concerned that the agency had suggested old-fashion wooden partition walls in building 26. However, the project manager thought that they had convinced them that it should be plasterboard walls after all. The client repeated their wish about initiating the refurbishment as soon as possible. Then the architects informed about a meeting with a fire-specialist. It seemed that with the current lay-out it would be possible to meet fire-safety requirements with only a smaller re-arrangement of some of the functionalities on the top floor. To a large extent, it appeared to be a matter of classifying the rooms as ‘offices’ and not ‘classrooms’. In connection to this, they spoke about making a list of requirements they
faced from various authorities – something which the project executive called a ‘construction judicial account’.

They moved on to the next item in the minutes where a number of ‘focus items’ were listed. The chief client-representative stated that they had addressed most of them (air-pollution, soil conditions and underground pipes, reference to existing buildings, interplay between building and landscape, and flexibility, although the client-representative was unsure what flexibility actually meant). However, the client-representative would like to comment on the two last items: environmental sustainability and financial sustainability. Regarding the former, he noted that this would be associated with extra expenses and that this might be something to discuss with the university one more time. The project manager said that the university had on an earlier occasion stated that they would not move into something that did not live up to the highest standard for environmental sustainable buildings (class 1). Regarding financial sustainability the architect said that they were currently working on this!

They talked a bit more about the requirements for ‘class 1’ buildings (it was mainly about low energy consumption) and decided to ask the university one more time if this was a priority. Then they returned to the issue about the underground lake-water pipes – ownership was still not clarified. The last part of the meeting was concerned with more project specific clarification regarding the placement of a staircase, the height of the basement, the height of beams and other parts of the structural system. Because of the site conditions and excavation cost, they aimed to raise the basement as much as possible. However the design was constrained by a wish for an amphitheatre build-up and a levelled floor in the auditoriums (a flexible build-up) as well as a levelled access-way from the old building to the new building. Finally they discussed the procedure for quality control.

**Design-group meeting the 26th of January 2009**

Two architects, the engineering consultant and the landscape architect attended this meeting. They talked about the amount of dirt on top of the underground auditoriums – the landscape architect had revised it after talking to the city-architect. Together with other changes in the landscape project, this had an impact on various other things (especially the structural system). Part of the basement was underneath the groundwater level and so the engineering consultant was concerned about how to address this from a technical point of view. They made sketches to illustrate different suggestions (see picture). It was a matter of aligning architectural styling (asymmetrical walls and slabs) with the most cost-effective and technically best solution. Likewise they spoke about the facade
and the engineering consultants ‘requirement’ for stabilizing discs. To ‘tease’ the engineering consultant the architects joked about building the basement in glass.

Picture 6.2.3.2: Sketching

**Design-group meeting 2nd of Feb 2009**

Two architects, the engineering consultant and the landscape architect attended this meeting (as well as the researcher). The project manager initiated the meeting by informing the participants about an extraordinary meeting that she recently had been called for by the client organization. The meeting had included the leading architects, the director from the client organization, the deputy manager and the ‘usual’ client representatives.

Architect (PM): “They stated that the project has to decrease in budget to a level of 18,000-20,000 DKK per m2 [it was almost 30,000 per m2 at the time] otherwise it will not be realized. Then we cannot go through with it and the basement [will be] removed and…well…we need to cut to the bone, completely, and we asked: Should we stop all activity? And they said: no, no, no, everybody wants to build this, but the university has an opinion about not moving into anything that cost more than 18,000-20,000 per m2 to build. Then we said: then we cannot build the basement. And we said that and now we have promised them to come up with an estimate that shows what the costs are without a basement. Actually it is a matter of drawing up two estimates we do not need to redesign…not now […]”

Landscape architect: And there are no auditoriums…?

Architect (PM): There are no auditoriums…all auditoriums are gone. I said it is not realistic. It is a University. This is their greatest need. But we are to dis-
regard this. The university have themselves proposed that we should then cut out the auditoriums….I think that then we also need to cut out the functionalities on the top floor if we are to be a little bit consistent. We remove the faculty lounge, we remove fitness, and we remove the kitchen…because this has an impact on the ventilation expenses…if we cut out these functionalities. And then it becomes an office building…actually….with a nursery. But to the university it becomes an office building.”

One of the other architects had been working on the spreadsheet to make the alternative estimate. However, the project manager commented that it was still 10.000 DKK too high per m². The landscape architect asked:

Landscape architect: “And what is causing this…? Is it the special roof?”

Engineering consultant: “I would like to say that that is one of the items that…”

Architect (PM): “I think the roof is very heavy…in relation to cost…um…”

Architect: “Really the whole exterior skin is heavy…”

Architect (PM): “Yes.”

Architect: “It doesn’t help in this…”

Architect (PM): “No it doesn’t”

Landscape architect: “And this is because we have to…”

Architect (PM): “I’d like to say that we are not to fiddle with…to fiddle with the shape of this building…

They talked about the content in the alternative calculation. The architect (PM) repeated that they should retrieve the basement and the “heavy functions” underneath the roof. The Engineering consultant continued:

Engineering consultant: “And what is it then…then we have a fancy roof compared to a cheap office building”

Architect (PM): “Yes”

Engineering consultant: “What more…is there something about the façade…where we preserve the fancy appearance?”

Architect (PM): “Well we hold on to the brick work being three times as expensive as standard brick work…in that it is standard courses we brick…we will not change it…we are not going to make standard brick work it is simply
too poor…it will get…and if they see an estimate with this, then that is the house we will face...

Engineering consultant: “But isn’t that what they are asking for right now?”

Architect (PM): “I don’t think so. I think that right now there is a political struggle going on between the university and the client regarding how long the termination respite can be and how you then…it is something about how they calculate rent in relation to the capital cost, which is very difficult to understand...

A bit later, the engineering consultant again argued that they would not reach their goal by removing the basement. The basement was only 2,000 DKK more expensive per square meter than all the rest. The project manager agreed. They continued to talk about the possibility of (further) reducing the cost of the (interior) surfaces on the upper floors (especially the top floor). Also, it turned out that substantial cost could be removed from the estimate that related to the construction pit. They continued to discuss the various cost items. In addition, the designers talked about the consequences that this might inflict on the schedule – now they did not know what to submit for the district plan revision the 13th of February. In relation to the matter of district plan approval, the project manager referred to the meeting with the client:

Architect (PM): I said that you need to know that there is focus on the landscape…and if you remove everything that is faculty activity in this house then you will not get the gardens activated in the same way.”

About a minute later she said:

[17.41] Architect (PM): “And when I said to the director that…we need to submit the 13th because otherwise we will miss out on some meetings in the city council, which is on this side of the summer vacation and then everything will be postponed far into the future. Then he said: This thing about the city council – forget about it. You won’t even get into play on these meetings before they have decided the whole plan for the University. The campus plan – it is not even decided yet. It was turned down on the last city council meeting as revenge for [name of other construction project that didn’t go as planned]. Okay what are you saying then?...We are caught between a rock and a hard place – in some political game....Wednesday we know what design we are to issue for the district plan process.

Then they returned to the rather expensive facade and roof:
Engineering consultant: “Well there is no doubt that we will never reach a level close to 20,000 DKK per m2 if we keep having this type of roof and the special façade.”

Landscape architect: “But isn’t that also something which we ought to…I know it is a gamble…”

Architect (PM): “It is really a big gamble”

Landscape architect: “Yes well you can make it as terrible that it is not…so that everybody can see: this is too poor…the city won’t even allow us to go through with it—if you listen to the city-architect then he is all for it – that we need to build something that is appropriate for 2009. In this location we cannot just build a house that looks terrible. It [would] be like that if [??]”

Architect (PM): “definitely…it will be terrible”

Landscape architect: “Then it will become an office building which you could place anywhere…and we need to explain this too them. I know…we hate doing this…”

[22.21] Architect (PM): “You risk getting it right back in your face. This is what we want”

Landscape architect: “This…this is what we want”

Architect (PM): “This is what we wish for. Just build this”

Landscape architect: “But that is what they ask for, right?”

Architect (PM): “Yes”

Architect (PM): “Otherwise we will never reach this level. I can see that.”

[…] Landscape architect: “But if we are to take this seriously, then we need to ask ourselves: what does it take to arrive at 18,000 per m2…then it is a standard pitched roof and a traditional, cheap brick standing upright…”

Architect (PM): “Asbestos cement slate on the roof and so on…”

Landscape architect: “I don’t know…but…”

Architect (PM): “But it will be something like that…asphalt paper on the roof…actually. Well this exercise we must do ourselves. Right now it is a garden without any excitement…it is really going to be a very different space…it is not going to be used in the same way. From being a dynamic place which guides people around the whole university. Now it will only become a garden in the corner”.
Thus the project manager gradually agreed to reconsider the roof and facade. They continued to talk about the build-up of the roof and potential alternatives. Then the project manager said:

Architect (PM): “But we almost need to do this drawing to explain to them what the consequences are of what they are doing. Because if they only see the numbers then we are left high and dry, because then they will just say: yes thank you.”

They continued to discuss various ways of achieving cost-savings: the possibility of lowering the building, changing the height between floors and alternative ways of constructing the roof. In connection to this one of the architects said:

[33.20] Architect: “If we are only to design a standard office building we can easily have a 2.5 meter floor height…well maybe you can’t…” [Laughter]
Landscape architect: “Then you can easily…then you can’t…?”
Architect: “Yes well…one also gets a bit grumpy…” [Laughter]

They talked about what had happened and that it was disappointing. The project manager concluded that it was only politics and she did not believe that they would end up constructing a house without a basement:

[37.03] Architect (PM): “I cannot see how they can leave their current facilities and their two big education rooms where everything goes on. Their auditoriums - they cannot do without them. That is what the university is – it is auditoriums.”
Landscape architect: “If they build this house now…”
Architect (PM): “Then they will never get the basement later on…no”

The landscape architect and the project manager agreed that they had gotten a long leash in the district plan process and the university would not get the opportunity later on – this needed to be explained to the university. Shortly after, the meeting ended.

Client and design-group meeting the 9th of February 2009
The client and design-group meeting included three client representatives, two architects, the engineering consultant and the landscape architect. The first item on the agenda was financial matters and the project manager clarified the latest development;
the designers had made a number of alternative estimates and the client had told them to proceed with the original design (alternative A) in relation to the district plan revision. The three alternatives were:

A. The original design
B. The original design with a decreased basement which only followed the imprint of the building
C. The original design without basement

All three alternatives had also been estimated with felt roof and a less expensive, but still high-end brick (but without any changes to the shape of the roof). So, altogether it was six alternatives. One of the client representatives stated that the user-group would probably not agree to completely cancel the auditoriums. For this reason they would like to explore alternative B, where the basement was decreased, but possibly it could still contain a single auditorium. The client representative continued:

Client representative: “But we don’t need an estimate. What the university asks is…”

Architect (PM): “Is it possible…to include auditoriums in the ‘imprint’”.

Client representative: “Yes, a letter from you. What is the use-value…what is the functionality in relation to alternative A?”

They talked about how this letter was a somewhat political document in that everybody (including the university) preferred alternative A, but they needed to do the analysis:

Architect (PM): “Of course the more arguments they have which shows that the other solutions are not feasible the better prepared they are to choose the big package”.

The latest developments in the project had taken focus away from the district plan proposal and outline proposal and so they continued to talk about the schedule and how they could still meet the deadlines. They discussed the level of detail in the material they were to issue – in this discussion they referred to the descriptions provided in the standard phase model. Although the university was still considering the reduced alternatives they agreed that they should propose the full package for the district plan revision, because they would never get the chance of applying for the large basement later on. In addition, they could always negotiate a reduction of the project if necessary. The deadline for the outline proposal (to the client) was postponed about two weeks to compensate for the extra work. In connection to this the client representative stated that the next phase (‘project proposal’) should not be initiated before they had a decision from the
university. The designers commented that this might have consequences for the staffing on the project – they would have to reassign their resources.

Regarding the estimates, the client representative added that their preferred contractor had briefly looked at the estimates and said that alternative A and B were realistic. However, they were a bit concerned about alternative C (regarding the cost of the footing). This lead to a discussion of pros and cons regarding competitive tender and a partnering approach.

Then they returned to the subject of the schedule. They repeated to themselves that if they did not meet the deadline for issuing a district plan proposal, it could postpone the whole process for another year – this could be used to put pressure on the university administration to make up its mind. An even greater threat to the schedule was, however, considered to be the approval process with the Cultural Heritage Centre. The project manager again explained how the architects planned to approach this stakeholder (a repetition from the last meeting).

Another issue in relation to the schedule was associated with the (lack of) access to the site. A client representative said that they were not going to buy a plot they could not use. So they had to wait until they were more certain about the project actually being realized. Therefore they discussed which person in the Children and Youth Administration they should talk to (and who they should avoid) in order to get permission to enter the plot. One of the client representatives would again try to initiate a dialog and also ask the university to put pressure on the Children and Youth Administration. The engineering consultant would consider the duration of the process, if all investigations were to be performed during weekends.

In connection to this, the Landscape architect made a comment about the playground becoming less attractive – the children would not get as much space. The project manager argued that the nursery users on the other hand would get the benefits associated with a new building. However, the designers expressed frustration about not getting the chance to present these benefits or consider alternatives in a joint process:

Architect (PM): “And this is what has been so hard. We would have liked to have an integrated user-process where they had spoken with each other about how to get the best of it; where on one hand you have these people who are to do research in silence and there is a group of children that are to run around and play outside. And how do we locate ourselves in relation to each other in the best possible way. We haven’t been able to have this talk.”
They presumed that the reason for this contrary behaviour was money and the fact that the capacity of the nursery stayed the same (while the playground decreased in size). Thus the Children and Youth Administration was probably concerned that they had to spend money on something which they gained nothing from.

A bit later they returned to the agenda and continued to talk about capacity for parking. They had received some quantities from the client, but this was not enough – it did not substantiate that there was no need for more parking spaces on campus and they had no time to conduct a real investigation. They therefore decided to ask the university to get a statement about excess parking capacity.

The client-representative then (again) raised the matter of energy class 1 and whether this was a requirement or a wish from the university. The designers were uncertain about this. In addition, the client-representative would like a rough estimate of the cost-impact of this requirement – it could be relevant to include in the negotiations with the university.

Subsequently they (again) talked about the underground lake-water pipes, the location of one of the staircases and the amount of soil on top of the basement slab. None of these issues had been completely clarified or solved. Soon after, the meeting ended.

Client and design-group meeting 23rd of Feb 2009

The first part of this meeting took place in the architectural office canteen while waiting for the meeting-room to become available. The participants were three client-representatives, the project manager (architect), the researcher, the engineering consultant and landscape architect. Initially, the project manager informed that the university would like another calculation to back up the letter they had received (a letter in which they had described alternative B with auditoriums incorporated into the reduced basement):

Architect (PM): “The way I understood it from [name of someone from the campus administration]...he would like us to set up this calculation in a way that shows that when an area is to be made outside...so you can get all these people out into the open and you arranged it for auditoriums...that you would then get very, very close to the budget for the whole package and that it isn’t viable to do anything else. But they would like us to work out this calculation...I’m just asking for green light. Because it is of course associated with some hours of work”.
With reference to the letter they had already sent, one of the client representatives added:

Client-representative: “We hoped that it could kill it...by saying it is a very bad solution.”

Shortly after the project manager said:

Architect (PM): “But there was a general agreement at the meeting last Friday that they were really annoyed with...at the time they did the [name of auditorium] they had spoken of [the possibility of] constructing two additional auditoriums underneath the big one...and they had never done it and now they had missed the chance and it had annoyed them ever since and they were not going to experience this again; that they in three years time would think that now they had missed an opportunity for building – they really want the whole package, they just want some ‘artillery’ [really good arguments].”

The project manager stated that this should be seen within the context of a 3 million DKK increase in rent per year in comparison to the rent that had been allocated the institute. They agreed however, that contrary to what they hoped for, there might be substantial savings when comparing this reduced alternative to the full package. Thus this calculation might work against their intentions and the designers were not going to ‘construct’ an estimate they could not vouch for. This led them to consider any other arguments that could work as ‘artillery’ in favour of the full package e.g. authority requirements. Later on it was also mentioned that the institute staff were trying to convince the overall administration that the extra 3 million should be distributed on all departments that potentially would use the auditoriums. However, the chief client representative then broke off the discussion by saying that it would be nice to have a real estimate of the reduced alternative – at least for internal clarification. Then he added:

Client-representative (chief): “...everybody knows where they would like to go.”
Architect (PM): “Yes”
Client-representative (no. 2): “There is no doubt about this”
Client-representative (chief): “And the rest is politics and…”
Architect (PM): “It is politics”
Client-representative (chief): “And that is not at this table that this [politics] goes on, right”.
Architect (PM): “No”

Architect (PM): “We make the calculation that we have been asked for tomorrow”

Shortly after, they changed the subject; the chief client-representative announced that the project could not proceed to the next phase (design development) before the university had made a decision. The architects were to finish the outline proposal and stop all activity. This was also to put pressure on the university to make a decision. In spite of this, they carried on with the meeting and came back to the issue about access to the nursery playground. The project manager said:

[21.17] Architect (PM): “Yes well now we just pretend that it will be build”

Client-representative (chief): “It will…that is actually one of the few things that I’m not very uncertain about.”

The university had to move out of their existing facilities, which also meant letting go of two large auditoriums, so the architect and the client representative were certain that some sort of building would be constructed. Then they carried on talking about the refurbishment of building 26 and how to accommodate the Cultural Heritage Centre – they had received a verbal message that they would like old fashion wooden partition walls instead of plasterboard walls. In addition they had a long talk about the process in changing the existing access-way and how to accommodate disabled people in the intermediate period.

Then they turned to the subject of the district plan proposal. The client-representatives had reviewed the proposal from the architects and had a few comments:

Client-representative (chief): “Then under the heading ‘architecture’… I think it looks very reasonable because everything is flexible. The only thing that is a limitation is the ‘asymmetric shape of the roof’, right?”

Architect (PM): “But this is a limitation given that it is to some extent a requirement by the city-architect.”

However, they realised that the roof was actually symmetric and the architect agreed to find a replacement for the word ‘asymmetric’. Thus, the client questioned the appropriateness in specifying the shape of the roof in the district plan. However, the client was in general very pleased with the material and with a few other comments the meeting soon ended.
Design-group meeting regarding calculation of a fourth alternative
23rd of February 2009

The attendees of this meeting were: two architects, the engineering consultant and the landscape architect. The architects started the meeting by questioning whether the reduced alternative could actually work in practice. To their disappointment, they came to the conclusion that it could actually function:

Landscape architect: “This means that we can actually make this type of solution that can actually function for them?”

Architect (PM): “Yes, this is unfortunately the case...”

Landscape architect: “Because that must be a prerequisite for making the calculation in the first place although I think it is crazy”

They thought that it was a shame that no space for breaks or wardrobes was provided and the amount of lavatories could also become an issue. They surely did not approve of this solution. Then they turned their attention towards the actual calculation. However, they found it hard to comprehend what the solution actually included without doing any sketches, so they considered making some sketches for internal use. Another approach would be to just add or retrieve line-items in the existing calculations:

Architect: “If we then calculate based on the big-one and retrieve it or take alternative B and add these things –it doesn’t actually matter to us.”

[5.41] Landscape architect: “Where do we get closest to the right number?”

Architect (PM): “Yes where do we get to the highest level?”

Architect: “I think we will, if we go from above.”

Architect (PM): “Then let us do that”

Shortly after the engineering consultant framed the situation:

Engineering consultant: “I’d like to say that this whole thing is to some extent a matter of joggling with numbers”

Architect (PM): “Yes that is what it is...”

Engineering consultant: “And a way we can do it with some credibility left is to say this is what we have done: we have retrieved this...”

They then considered revising the overall estimate for the whole package (alternative A) based on the outline proposal – because now that the design had become more detailed,
the estimate could probably be reduced with a couple of millions (the engineering consultant stated that it potentially could amount to 12 million in savings). This could make it more attractive to choose alternative A. Then one of the architects reflected on the situation:

Architect: “No but this is a bit similar to what we have done before, right? Now we are too high then we go backwards and come up with a new number.”

Engineering consultant: “We dance around a bit.”

Architect: “Yes we do”

They also discussed the problem in revising the estimate for alternative A without revising the estimates for the other alternatives – they would lose the comparability. This led to a discussion of whether they at this point – where they knew the target to aim for – should start looking for ‘reel’ design changes that would lead to cost-savings in the outline proposal and thus make alternative ‘A’ more attractive:

Landscape architect: We can help ourselves a great deal if we think about it now. And therefore it would also be a bit stupid to do the outline proposal first and then the calculation afterwards. Instead of looking at the calculation now and say: Okay we are too high, we need already at this point to cut down in the project – before we hand in the outline proposal.”

Architect (PM): “But we completely smash the comparability.”

Landscape architect: “Yes but...I think it is something else...I agree that we need to make this calculation based on this, because otherwise the comparability will become impossible...but what I mean is that it would be stupid of us to hand in an outline proposal on Monday without having performed an estimate of the cost”

Architect (PM): “Yes you are right”

Landscape architect: “Because we risk handing over a project which is too expensive, because now we know which level we should aim for.”

Then they talked about the schedule and the challenge of revising the both the drawings and the estimate for the outline proposal. They agreed that they should try to buy a bit more time. Instead of trying to ‘work’ the numbers they decided to scrutinize the design and look for ‘real’ savings.

Next they discussed the stand-still situation. The landscape architect thought that the real problem would be the nursery together with the city council process – these stake-
holders would obstruct the process even more. In connection to this, the landscape architect briefed the architects about their latest thoughts about the playground design:

Landscape architect: *Area-wise we have drawn it like this. 1450 square-meters...it is just [name of someone] who have been sitting making some sketches...if you then choose to use the whole area up close to the building then we get 1750 square-meters...and there is some tactics in this...”*

Architect (PM): “Yes...what do they have today?”

Landscape architect: “*Today they have more than 2000”*

Architect (PM): “*Yes, but they are not entitled to more than 850...so this is fantastic. That is twice the amount...”*

Landscape architect: “*And what we are talking about is then...not that it is completely finished...”*

Architect (PM): “*The problem is that all our tactics is a waste because nobody sees it. The people who are to decide it they don’t see anything...”*

They continued to discuss user functionality and behaviour. They also drew on their own experience as parents with children in nurseries. They tried to weigh various concerns. The landscape architect seemed to come up with a principle solution that seemed to integrate most of the concerns. Then the meeting ended.

### 6.2.4 Analysis

**Hermeneutic inspired interpretation**

**Source criticism**

Taking on a source critical lens, the above representation of what took place at the design meetings is a result of the researchers subjective choosing of relevant data. The sound recordings and full transcripts, although confidential in relation to the public, are however available for the PhD review panel. This provides some guarantee against fraud or ‘cherry picking’. Regarding the latter, it should also be noted that representatives of the architectural company, the client organization, the engineering company and the university have all approved this chapter (including the analysis).

Although some meanings may have been lost in translation, the transcripts are to be considered as remnants of what was actually said at the meetings. However, the information brought to the table by the meeting participants, about what had been said at
other meetings (with the university administration, the cultural heritage centre etc) is only to be regarded as narrative. For example, it is uncertain what the user-representatives actually thought about the reduced alternatives. It is also uncertain what the nursery-users and the Children and Youth administration actually thought about the plans. However, in relation to the latter, it seems fairly certain that the land-surveyor and geo-technical engineers were in fact restricted from entering the nursery plot and no user-group had been established. These are, if not strong indications of the stakeholder’s uncooperative attitude, an expression of lack of cooperation between the client and the stakeholder, which was an obstacle to the project.

In relation to bias, the researcher may have been influenced by his affiliation to the engineering company who participated in the case-study. Also, the case-study participants may have been influenced by the presence of the researcher and the sound-recording device. However, judging from some of the quotes where the participants spoke rather freely about their tactics to persuade various parties, it seemed that a level of trust had been established. Also, these observations of ‘natural occurring data’ – where the actors work in their natural setting – are in general less prone to bias in comparison to interviews (Silverman, 2006).

Regarding criticism of distance, the data is also fairly good (in comparison to interviews), since it provides actual accounts of what was said – not a recollection of it. However, when transcribing the sound-recordings, the researcher sometimes found it difficult to recognize the voices of the various meeting participants and in these cases the transcript became a product of the researcher’s recollection. To make this an ‘open’ uncertainty, the researcher has – when in doubt – labelled the quotes “presumably” (the architect) or “someone said”. Regarding criticism of dependence it is obvious that the information, which the meeting participants brought to the meetings, had been passed through other hands. Thus, as mentioned above, the validity of this information is questionable. Nonetheless the researcher can focus on the way the information was dealt with at the meetings and the meanings that were established. In this respect the data provides good ‘correspondence value’.

The conversation view of design

The data provides a range of exhibits of a ‘conversation with the situation’. Thus, the initial field excursion, where the architects introduced a particular way (precedent) of solving the cell-office requirement, illustrated a selective attempt to frame this requirement. This lead to a reframing; the cell offices were not only a matter of reducing noise, but also a matter of being visibly separated. The architects’ perception of value clearly guided the initial frame-experiment, but the users were not open to persuasion – instead
the architects gained new understanding of the situation. It is also noteworthy how the users were unimpressed with the architecture and mostly commented on everyday functionality (e.g. bookshelf space) – an observation I will return to below.

However, following the lines of the conversation view of design, the co-location issue should also be highlighted. Here the initial framing, ‘co-location’, was found unfeasible in relation to other ‘disciplines’, such as quality of the physical work environment and space constraints. This new framing of the situation where co-location was seen as unfeasible (as well as the bridge) was attempted conveyed in a persuasive manner at the user-information seminar – to establish a common frame (again it should be stressed that ‘persuasion’ is not necessarily ‘bad’, but a natural facet of frame-negotiation). Here various design elements and associated disciplines (district plan approval, duration of intermediate phase, flexibility, physical work-environment etc) were named to create a sequence of arguments towards the preferred solution. Some of the design elements were directly derived from the earlier user-seminar, which formed the accepted premises. However, this scheme was to some extent punctuated by a very concrete request for blackboards and concerns regarding construction noise – which redirected the conversation towards smaller and more specific parts of the design task.

The conversation view of design is also exemplified with the ‘discovery’ of the underground pipelines, the central heating station and the gradual learning about their functionalities and associated constraints. The consultants enquired into the situation, which provided feedback that again spurred counter-moves to shape the situation.

A fourth example was provided at the city-architectural office, where the architects explained the reasoning behind the current design. Here a narrative was constructed in relation to the landscaping in order to display the coherence between design elements and associated disciplines (‘functions of the building’, ‘arrival issue’, overall architectural idea of ‘spaces in spaces’ etc.). Through conversation with the user-representatives a reframing of the function of the auditoriums (a change in meaning) had apparently spurred a development in the project; the auditoriums were not only to be utilized by the department, but the whole faculty and so the logistics had to be reconsidered. At the same time, however, the overall architectural idea (spaces in spaces) needed to be maintained. Nonetheless, the city-architect was not content – the landscaping lacked amenity value – and so he encouraged further ‘conversation’.

Within this context, the notion of a ‘complex client’ seems appropriate. Thus, the conversation became a balancing act between the interests of various parties: the client, the university users (who were split between administration, faculty and department repres...
sentatives), the nursery and a whole range of authorities, who represented the interests of the wider public and political context.

How did the participants' perceptions of value manifest?
In relation to research question 1, the participant’s perceptions of value were expressed in various different ways: in very concrete requirements or preferences (cell-office, black-boards etc.) or more indirectly through the questioning of (reflection on) the desirability of some of the solutions (cell-office, shape of the roof, sustainability etc.). Priorities – or value judgements – were particularly expressed when cost became an overriding discipline. The relevance of some of the qualities were put into question (e.g. sustainability and ‘fancy appearance’), which in some cases spurred defensive behaviour by the proponents of these qualities/disciplines e.g. the architects defending the shape of the roof. It was also apparent how different levels of abstraction were at play: From the societal value of cultural heritage to the functional value of cell-offices and blackboards.

Returning to the conversation metaphor and Schön’s framework it seemed that the parts of the conversation concerning framing and priority/naming of design elements (and disciplines) was more affected by the individuals perception of value than the moves within a frame-experiment. Thus whether architecture should have priority (be a significant discipline) in relation to the shaping of the roof seemed very affected by what the individuals (architects) thought was valuable, whereas the moves, to achieve this end (how to incorporate eaves gutters, how to built the structure), seemed more a matter of technical problem solving.

Generally speaking, as the framing and priority of design disciplines becomes a conversation/negotiation of its own, in group work – instead of a tentative choice, a hypothesis experiment, by a sole designer – one might even speak of two types of conversations nested within the overall conversation:

- Type-1 conversation concerning the exploration and integrating of various technical and architectural aspects of the design.
- Type-2 conversation (or frame-negotiation) about framing and priority of design disciplines/qualities

Examples of Type-1 conversations would be the conversations about the height of the basement, how to accommodate the underground water-pipes and ways to potentially incorporate the district heating station in the new building. It is proposed that these types of conversations are not heavily influenced by individuals’ perception of value
although, if one examined the conversations very closely, they would probably contain all aspects of naming, framing, moving and evaluating. Examples of Type-2 conversations would then be the conversations about the shape of the roof and cell offices. Here it is more a matter of understanding the elements (office space, types of partition walls) and disciplines (noise, visibility), agreeing on the priority (both noise and visibility are equally important) and framing the situation (professors should be completely separated). Perceptions of value seem to manifest and guide these kinds of situations. Another or supplementary interpretation could be that in Type-1 conversations the participants preferences coincide (or at least the participants think they do), whereas in Type-2 conversations there is a conflict in preferences, which needs to be settled.

It also seemed that these perceptions of value or preferences were heavily structured by professional values, which is something that will be further discussed below.

**Committed to an established mesh of disciplines**

However, the metaphor of conversation does not fit entirely. In relation to some of the aspects of the problem, the conversation had evolved into a monolog. Thus, it seemed that the architects had committed to the overall disposition and exterior architectural expression. They had arrived at something which they liked and were further affirmed in their choice by the user-representatives, the client and the city-architect. So they aimed to freeze the design. The design commitment also aligned with the discipline imposed by the schedule – the client was in a haste to carry on with the project (to get return on investment). Therefore the conversation was to some extent restricted within the boundaries of this overall design idea – the Type-2 conversation had ended – and attention was directed at means for accomplishing this end.

When interests were raised, which potentially could inflict changes to the design, the consultants searched for arguments that could either reject these concerns as ‘impossible’ (bridge, co-location) or substantiate that the concerns were already fulfilled or irrelevant (parking spaces, air-borne exhaust particles on playground). Accordingly, a lot of time was spend on discussing what arguments to bring forward in relation to various parties, how to communicate and what people to address (and not address). The user-information meeting was mostly a matter of legitimizing the design. The pollution issue in relation to the playground was mostly addressed with a mobilisation of arguments (without doing anything) and a lot of time was spend on tactics in relation to the nursery. Especially the nursery became a problem because the Children and Youth Administration apparently refused to ‘listen’ to the stream of arguments (“The problem is that all our tactics is a waste because nobody sees it”).
Additional problems aroused when the consultants suddenly were met with a new over-riding discipline in the form of a cost constraint, which was incompatible with the established ‘mesh of disciplines’. The architects were under pressure to open up the Type-2 conversation. Furthermore, the consultants, who were convinced about the value of their design, were asked to convey this message through a media, the spreadsheets, which – in their mind – was unfit for the purpose:

Architect (PM): “But we almost need to do this drawing to explain to them what the consequences are of what they are doing. Because if they only see the numbers then we are left high and dry, because then they will just say: yes thank you.”

In this constrained situation they were tempted – and seemingly encouraged by the user-representatives – to ‘work’ the numbers, in order to provide the political documents that were necessary to get the ‘best’ project moving. This ‘game’ will be further discussed within the perspective of critical theory.

**Interpretation inspired by critical theory**

**An arena of lobbying work**

This case-study shows how much time can be spent – in a design process – on analysing and anticipating respectively the motives and ‘moves’ of stakeholders to create strategies and documents, which can influence the course of events. It can be described as an arena of lobbying work. The consultants found themselves in a situation where the three client- and user-organisations were engaged in hard negotiations of rent and buy of the plot. In this arena, the consultants were apparently ‘used’ as fabricators of political documents. Of course the source-criticism points at the uncertainty regarding these apparent ‘wishes for artillery’ placed upon the architects – we only know of this through the narratives of the architects. Nevertheless, the discussion surrounding the production of reduced alternatives revealed that these were not to be regarded as ‘reasonable and sincere’ options, but distorted value-laden information, which only served to qualify the original solution. This aligns with the social process perspective on designing (chapter 4.2). Likewise, as pointed out above, the presentation at the user meeting was thoroughly put together in a way to legitimize the design and proactively reject all complaints that the participants could think of. The listing of positive and less positive attributes regarding the two alternatives of ‘co-location’ and ‘almost co-location’ in the slides presented, with respectively dull and bright colours as well as a question-mark and a smiley, was tendentious. Accordingly, as one of the users stated: “It would look to me as if there is not [going] to be that much discussion right now, but I have one ques-
If the users came up with requests, which the consultants or user-representatives had not thought of or had no answer to, the request was added to the ‘list’, which indicated that it would be one among many wishes that could not be guaranteed (they shelved it).

Consultants pursuing their own goals

The consultants were, however, not impartial in relation to client/user wishes and they were not ‘caught’ in a political game – they were active players with objectives of their own. Thus, if the consultants disagreed with the apparent wishes of the users, it became a matter of explaining the ‘misconception’ (via drawings, estimates and statements). Specifically the architects’ personal involvement was reflected in their disappointment, when they were asked to find substantial cost-savings. They were devoted to the delivery of a high-value product. However, what was considered to of high value seemed to be structured by their own objectives and values. Accordingly, in the theory chapter (4.2) it was described how designers often become committed and even emotionally attached to a specific solution (Cross & Cross, 1995).

Particularly, in relation to the fabricating of reduced alternatives, the consultants were acting to their own benefit. The architects’ objective was not only to provide a project that satisfied the client and users, but something they themselves could be proud of from a professional point of view. They could lose in two ways: if the project got cancelled – by the permitting agencies or the client – or the project was approved in a form that did not live up to their architectural ambition. In this situation, they were inclined to make the reduced alternatives look overly unattractive. They had fallen in love with the ‘full package’ and hoped that the cost-constraint was a mere gambit in a negotiation within a political context. They were, however, unsure of this and started to look for cost-savings that would not jeopardise the overall architectural expression (they wanted to keep the initiative in the game).

However, it could be argued that the consultants’ partial behaviour was legitimate as part of their ‘advisor’ role. Nonetheless, when the architect(s) became defensive – when the shape of the building was questioned – they left their role as ‘objective’ advisers and acted as passionate proponents of architectural value. Within this line of reasoning, it is specifically noticeable that the architects withheld the possibility of changing the distinctive shape of the roof, but only provided the alternative of changing the material. The architects even tried to write ‘asymmetric shape’ into the district plan.

This should be seen in connection to the observation that the users mostly showed interest in local functionality (shelf space, blackboards). Their object of attention may of course be an expression of them being content with the overall architecture – or they felt
unqualified to comment on it – but it seemed that the only remaining argument for keeping the expensive roof and facade, expect for the architects’ own ambitions, was the district plan approval process; in which ‘suitability’ to surroundings is indeed of great importance. However, this argument also seemed convenient to the architects. In a different matter, when they wanted to expand the building two meters across a boundary in the district plan, they simply asked the city-architect, who approved it on the spot although one of the case-officers said it would be a violation. Thus, the vagueness of the rules positioned the architects in powerful position; their supposedly knowing of what the authorities would accept or not accept seemed instrumental in their pursuit of architectural glory – to this end they could benefit from the social norms that, in these matters, grant ‘the architect’ a position of authority.

On the other hand, the client participated in the meeting with the city architect and nothing was hidden in that respect. However, it would be unlikely that the city-architect would encourage a more modest architecture than what was presented – to this end the architects and the city architect were in alliance. Although the city-architect had foreseen the financial problems and warned the architects and client about the cost of the design, he at the same time praised and encouraged it.

**Interpretations inspired by postmodernism**

**Structured by norms and values of professions**

The suspicious notion of manipulative architects is, however, not accurate because the tactics were punctuated by instances of reflection (leading to reframing) and professionalism. Thus the landscape architect stated (reframed the situation):

> “But if we are to take this seriously, then we need to ask ourselves: what does it take to arrive at 18,000 per m²...”

This may be seen as an instance of 2nd order reflection (cf. chapter 4.2.), where the participant implicitly questions the desirability of their goal (achieve architectural magnificence – ignore the request for anything less). In addition, both the engineering consultant and one of the architects queried the “juggling with numbers” and directed attention towards “credibility”. Furthermore, the participants reminded themselves that they were not doing ‘politics’, although this is a strong indication that this was in fact the route they were going. Thus the norms and values associated with professional credibility seemed to restrain the participants from manipulating the numbers. They acted as both “gamesmen and statesmen” (cf. Astley & Van de Ven, 1983:264).
Accordingly, although the above description may shed a negative light on especially the architects, one could also choose a more positive interpretation and emphasize that they seemed to act as passionately proponents of what they thought would be best for the users and surrounding society. Thus, it is legitimate to be concerned about the fact that the building was to stand for possibly 100 years and be surrounded by historical buildings. It is also uncertain whether the City-architect in fact would reject anything less than the expensive appearance of the building. Furthermore, one should be careful about seeing the client and users as ‘victims’ of the game. Especially the client representatives were very experienced. Accordingly, the chief client representative made sure that “asymmetric roof” and the expensive facing brick were not incorporated into the district plan proposal as fixed requirements.

The case-study also provides support for a deterministic understanding of values. Thus, it seemed (again) that the participants’ perceptions of value were heavily influenced by their professional role frames: In an almost stereotypical way, the architects were guarding the architectural expression, which was questioned by the engineer, who was more pragmatically concerned with constructability and cost, whereas the users concentrated on local functionality (sharing of offices, access-way, shelf space, noise, black-boards). The client aimed to deliver a building that met the users’ needs, but it also had to be flexible in relation to the needs of any future end-users (cf. discussion of the district plan) and it had to be constructed as soon as possible to get return on investment – it needed to be viable. At some occasions the participants explicitly identified themselves with these role-frames as when the architects tried to tease the engineer with a suggestion about building the basement in glass. If the architects and the engineer saw themselves as mere servants of their respective clients (the architects were to be considered as client to the sub-consultant) then such a joke would not be meaningful. Consequently, the values associated with the professional role-frames structured the participants’ differing perceptions of value. On the other hand, one may again, as in the previous case-study, question this interpretation and argue that the participants may have ‘chosen’ their profession and role-frame based on values congruence.

One may also consider the notion of hyper-reality. Thus, as described above, the participants spent a lot of time speculating about the goals and (hidden) agendas of the other stakeholders without actually knowing them. Nevertheless, this was used to form strategies for approaching the stakeholders. Specifically in relation to the Children and Youth administration, the nursery personal and the board of parents, they had very sparse information of what was actually going on – they were excluded from direct conversation. However, as a substitute, the core participants created a speculative conception of the values and agendas of these outside stakeholders, a ‘hyper-reality’, be-
cause they had no other choice. However, the interpretation that these stakeholders were working against the project because of money as well as a misconceived understanding of the consequences of the building project, might not have any anchor in ‘reality’. In any case, the client only saw this as a mere obstacle that was to be removed through lobbying work and the architects were sure that if only they were allowed to explain the advantages of the (their) project, the stakeholders would see the benefits. However, these conceptions may say more about the participants themselves. It was the same narrative that was created regarding the ‘situation’ between the university and the client organization; everybody wanted this project, the stand-still was just a gambit in a political game of negotiation. The possibility that the university simply could not afford the project and that the Children and Youth administration was not going to accept the project was diminished. A year after the project was still on stand-by.

In relation to the users and the issue about cell-offices, it is also noteworthy how the architects did not acknowledge that old-fashioned cell-offices were a valid solution. Thus, although the architects accepted that there was no way around it, they were certain that the users were wrong about this – they were old-fashioned. The architects knew what was right. This can likewise be described as a state of self-referential hyper-reality. The counter-argument is, of course, that the architects were, as consultants, trying to push the design beyond the expectations of the users, who were not able to ‘see’, but had to ‘learn’ the benefits of open-plan offices.

6.2.5 Summary
The case-study provided good confirmation of the conversation view of design. When focusing on value, it was proposed to make a distinction between Type-1 and Type-2 conversations. The latter is much more guided by (differing) individual perceptions of value than the former. It seemed, however, that the conversation had come to a halt in relation to the overall lay-out, which the architects and the client had committed to. This led to a ‘monolog’ in relation to any concerns or interests which suggested changes to the established mesh of disciplines. The overall solution had been frozen and it’s conformance to any other design elements largely became a matter of argumentation (not design). This ‘freeze’ became a real problem when the project was seriously challenged by a budget-constraint that was incompatible with the established design – here the consultants lacked the media for conveying a profound argumentation.

Furthermore the critical theory perspective was used to describe the situation as an ‘arena of lobbying work’. In this arena a lot of time was spent on tactics and design of political documents that were disguised as expert statements. The consultants did not act impartial in this situation. Especially the architects seemed to defend the architectural
expression and possibly misused their authority as architects to determine what would be accepted in the district plan approval process. Here they were in alliance with the city-architect. Accordingly, the social process view of designing came to the foreground (cf. chapter 4.2).

However, the postmodern perspective to some extent punctuated this understanding of manipulative consultants and drew attention to their concerns about credibility. Also, their defensive behaviour, in relation to the architectural expression, may be an effect of the values, which are associated with their profession and consequently what they genuinely think is ‘best’ for all stakeholders – including the surrounding society. Thus, all core-participants expressed preferences, which were consistent with their classic role-frames and associated values. Thus the participants’ differing perceptions of value seemed somewhat determined by these roles as ‘engineers’ and ‘architects’ etc. In addition, the client should perhaps not be seen as a ‘victim’; the chief client representative was quite experienced and he made sure that the district plan proposal was ‘flexible’ in relation to architectural expression.

Finally the notion of hyper-reality was considered. To some extent the client and consultants were successful in creating a speculative understanding of the situation, which had lost touch with ‘reality’. They did not consider it as a real possibility that the university would not be able to lease the building or that the Children and Youth administration simply were not going to accept it. The interpretations are summarized in table 6.2.5.1.

<table>
<thead>
<tr>
<th>Research questions</th>
<th>Hermeneutics</th>
<th>Critical theory</th>
<th>Postmodernism</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do the client and other project stakeholders’ perceptions of value manifest? (RQ 1)</td>
<td>• Through specific requirements, suggestion of alternatives and priorities of solutions  • By questioning or defending the desirability of solutions  • Trough “Type-2” conversations (frame negotiations)</td>
<td>• By subjectively presenting desired alternatives and by silencing unwanted alternatives</td>
<td>• Through their ‘chosen’ role frames</td>
</tr>
<tr>
<td>What issues can be identified in conceptual construction project design-processes in relation to management of client value creation? (RQ 2)</td>
<td>• The conversation becomes a monolog</td>
<td>• Distorted, value-laden information  • Misuse of professional authority</td>
<td>• Hyper-reality</td>
</tr>
</tbody>
</table>

*Table 6.2.5.1: Summary of case-study answers to research questions*
In view of the somewhat critical interpretations, it is particularly noteworthy that the architect (the PM), the client, two user-representatives, and the engineering consultant all approved the analysis. No feedback was obtained from the landscape architect.
6.3 Case 3: Hospital project

6.3.1 Case description

The scope of this project was relatively large. It was an acute care and women’s and children’s hospital with 555 beds and a floor area of almost 1 million square feet (93,000 m²). It comprised a tower and a base with two parking levels underneath it, which was to be built on a sloped building site in downtown San Francisco, USA. As with all buildings in this location, the hospital had to be able to resist earthquakes. The plans for improving health care facilities in this area had been underway at least since 2000, where the client organization considered renovating and retrofitting existing facilities. This project was abandoned as it lacked profitability and it was decided to build a whole new hospital. However, the first attempt to do so was cancelled before getting into detailed design. The estimated costs of this new facility increased to a level that was unacceptable to the client. After a reorganization (some firms were laid off and new firms came on board) and adoption of new management principles (lean) a third attempt began in 2006/2007. This was successful underway in the detailed design phase when the case-study was conducted. Consequently, because of the project history, some of the interviewees have been working on the project for more than 8 years.

Management approach – a distinctive feature

The management approach to this project had become a distinctive feature. The project was organized around the four key participants: the owner (Sutter Health), the client/user (CPMC), the general contractor (Herrero-Boldt27) and the architectural firm

27 Joint venture between Herrero Contractors Inc. and The Boldt Company
(Smithgroup), who were contractually bound in what they called an integrated form of agreement (IFOA), which is a type of partnering or relational contract with shared incentives and risk (see chapter 5.6.1). In addition, sub-consultants and sub-contractors (named trade-partners) were brought on board as early as possible to contribute with specialist knowledge up front. They were equally included in a shared incentive contract, where they were compensated for (all) their work, as soon as they got involved in the project. Only a few companies, who provided uncomplicated, easy definable services/components, were included on a fixed fee basis. All companies in the project organization were co-located in the same building on the same floor to ease everyday communication and collaboration. Most of the detailed design work was organized in cross-specialist ‘cluster-groups’ (structural cluster-group, interior cluster-group, MEP cluster-group etc) which were fed with information by the architectural programmers and planners. The cluster-groups were usually chaired by a representative of the general contractor and often include architects, sub-consultants and sub-contractors (trade-partners). Lean was the overriding management philosophy and it was heavily promoted by the owner and the general contractor. Everyone who came on board was urged to attend a study group (Study Action Team) where Liker’s book “The Toyota Way” (2004) was studied and discussed. In addition, the promotion of lean was very visual. Lean mottos were displayed on almost every wall and the conference rooms were named after Toyota car models (see pictures below). The management tools and methods adopted in this project included.

1. Target Value Design\textsuperscript{28} (TVD)
2. Set-based design
3. A3 reports
4. Choosing By Advantages
5. Last planner system (LPS) / reverse phase scheduling
6. Value Engineering (VE)
7. “Big room” meetings (obeya)

These methods and tools are all described in chapter 5.3, 5.5 and 5.6. In addition to this, the companies made extensive use of 3D / Building Information Modelling (BIM). The design was integrated in a 3D computer environment and to some extent linked to quantities (4D). Also, attempts had been made to simulate construction processes (5D modelling). The wide-ranging involvement of trade-partners and the prolonged and extensive planning and review of design could also be understood as front-loading (cf. chapter 5.5) – a strategy which is based on the belief that the effort will repay itself via a much more efficient execution phase and a better product altogether.

\textsuperscript{28} A development/renaming of target costing – see chapter 5.6
Case-study relevance

The case-study provided a first-hand opportunity to observe practices, which, by some researchers and practitioners, are considered to be state-of-the-art in construction design management. In addition, the management rationality on this project was very clear with regard to how ‘client value’ was to be created; through extensive use of lean techniques and particularly through ongoing evaluation of all design solutions with reference to their advantages and cost. For these reasons it seemed to be an interesting, and to some extent critical case-study. The resources that the general contractor and the client were spending to make lean work on this project, as well as the use of pioneering lean consultants, made this a case, where one with confidence could say: if they experience problems with the lean approach, then problems are likely to arise in other projects where lean is adopted with less resources and competences. In the following the data collection approach and results will be presented.
6.3.2 Data collection and case-study research questions

The data collection was to a great extent structured by the project ‘story-line’ represented by the TVD-graph below (figure 6.3.2.1). The graph shows the development in the estimate of construction cost (red line) and the target cost (dotted purple line) from September 2007 until April 2009. Thus it can be seen how the estimate had developed from being considerable over target (60-90 million dollars) in autumn 2007 to going below target in spring 2009. The target cost had simultaneously increased as the client had added more scope to the project.

From a project management perspective, this is interesting in itself. However, with regard to the purpose of the research, focus was directed towards the ‘stories’ behind each of the major changes in the TVD chart, which the TVD-manager had mapped (the text-boxes). Consequently the graph represents 29 groupings of cost-change stories, where most of them represent changes in design. Altogether, 53 stories have been identified by the author.

The underlying reason for focusing on these changes was the presumption that perceptions of value are likely to be reflected in design-changes because value judgements are likely to structure the reasons for making the changes. In addition, one more or less explicit reason for value management and systematic briefing is (as described earlier in chapter 5.2 and 5.3) to avoid costly changes/rework in design caused by lack of understanding of clients’ needs and “value-system” (Kelly et al, 2007:212; Tilley, 2005). Thus, the idea was that an investigating of the reasons for the design-changes might contribute to a greater understanding of the notion of value in construction design processes (cf. research question 1). More specifically, a hypothesis (or pre-understanding) was:

*Design changes often emerge from:*

a. Changes in the client’s perception of what is valuable and/or
b. Lack of understanding of the client’s perception of value

An alternative way of formulating this pre-understanding with more direct reference to research question 1 would be that: the client’s or other stakeholders’ perceptions of value will manifest in design-changes. The first case-study research question then became:

1. What are the reasons that underlie the changes mapped in the TVD-chart?
Figure 6.3.2.1: Target value design chart
Secondary, this case-study could provide valuable insight into the dynamics of the Lean/TVD process – a concept that aims to facilitate client value creation and, as mentioned above, is considered to be state-of-the-art in design management.

Consequently the investigation of reasons for making design changes (which within this approach was thought to add value to the client organization) and supplementing observation and questioning about the TVD/lean process might also be useful with regard to research question 2: Is it plausible that the management approach really stimulated these ‘value-adding’ design changes? And what problems might be associated with the management approach? Thus, corresponding with the first case-study, where the workshop model concept was examined, the second case-study research question can be formulated as:

2. What were the problems and effects, which the participants associate with the lean concept?

These case-study sub-research questions, which relate to the overall research question 1 and 2, are reflected in the interview guide shown in appendix 5. Observations were guided by the protocol described in the methodology chapter (chapter 2.3.1).

Collection and structuring of data

The mapping of cost/design changes were done according to the structure shown in table 6.3.2.2, which illustrate a fraction of the spreadsheet established in this case-study (the spreadsheet includes 53 items of which 6 are shown in figure 6.3.2.2). The data was primarily obtained via interviewing the TVD/estimating manager from the general contractor, who was responsible for providing the overall estimate update in the weekly TVD meetings (with input from the cluster-groups). The TVD-manager’s stories about the changes were sound-recorded and transcribed into the spreadsheet in the ‘Detailed description of change’ column (figure 6.3.2.2). This established the basis for further validation/clarification through reading of all 149 A3 reports available at the time, where 67 of them were identified as ‘product change proposals’ (many were evaluation reports for selection of trade-partners and some were change proposals concerned with administrative procedures or the management approach). These reports provided additional information on some of the changes represented in the TVD chart. In addition, detailed information was sought through interviews with representatives who performed and coordinated the design on a daily basis.
Table 6.3.2.2: Excerpt of spreadsheet established for analyzing reasons for design changes

<table>
<thead>
<tr>
<th>Link to other change no.</th>
<th>Trade-off considerations (other alternatives)</th>
<th>Related As</th>
<th>2nd level of reason for change</th>
<th>Some reason for change</th>
<th>Comments to cost impact (Spy Market)</th>
<th>Detailed description of change (according to instructions)</th>
<th>Character group</th>
<th>Sub-group name</th>
<th>Description of change in PDP chart</th>
</tr>
</thead>
<tbody>
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Note: Full table is too large to display. Please refer to the original document for complete details.
Altogether fifteen people were interviewed including seven cluster-group leaders, who represented: Mechanical- Electrical and Plumbing (MEP), Interior design, Exterior enclosure, Structural design, Production, Sustainability and Equipment.

Also, two architectural planners, an exterior enclosure architectural designer, the value manager and three trade-partner (sub-contractor) estimators for structural, plumbing and electrical work were interviewed. Furthermore the data and the preliminary results were presented ‘back’ to the TVD manager in a second interview for commenting. Finally, when this sub-chapter (chapter 6.3) had been written, all interviewees were asked to approve or provide comments to the analysis. All but one (who was on parents-leave) approved. Especially the value manager provided some comments which have been incorporated as foot-notes in the text.

Of the 53 ‘change-stories’ identified in the TVD chart 20 of them were validated by at least one other source than the original (another interviewee or an A3 report). 29 of the stories were only provided by one source (usually the TVD manager) and 4 has been left out because none of the interviewees could remember what had happened. The stories, which were not validated by some other source, needed however (also) to correspond to the short text written in the official TVD chart that was displayed to the project organization every week – this to some extent provided a constraint to any attempts of fiddling with the stories.

*Picture 6.3.2.3: Promotion of a ‘lean culture’*
In summary, the case-study is based on 16 sound-recorded, semi-structured interviews with 15 different people, written notes of observations made at various meetings (4 Value Engineering-meetings, 7 Target Value Design meetings and 6 design planning (LPS) meetings) and project-documents obtained over a seven week period (A3 reports, meeting documents, programme validation report etc). In addition to this, informal talk with project participants (especially the value manager) as well as a presentation of the preliminary findings to a lean consultant and the project executive (from HerreroBoldt) provided valuable information and feed-back.

The structure of the analysis is first to present the reasons-for-change categories that are based on the design/cost-changes represented in the TVD-chart. This is supplemented by graphical representations of frequency, as well as cost-impact linked to the reason-for-change categories, to provide an overview of their apparent 'significance' in the project. This is to provide grounds for discussing the pre-understandings mentioned above. Subsequently, the effects and problems associated with the management approach, which were identified through interviews and participant observations, will be presented. Lastly, these findings will be reflected upon via the meta-theoretical framework and a summary will be provided.
6.3.3 Analysis: Reasons for change
Each of the design changes identified in the TVD chart were categorised according to:

1. The primary reason for choosing a design-change, which is termed ‘First-order reasons’ (e.g. the new solution was chosen because it was cheaper than other known alternatives)
2. The reason for considering a design-change in the first place, which is termed ‘Second-order reasons’ (e.g. a new trade-partner came on board and suggested to make a change).

Although there is no clear cut between these two ‘levels’ and one in principle could keep asking why (why did the trade-partner suggest it?) to explore the ‘root cause’ in more depth, this distinction was found to provide a reasonable level of information as well as being practical. The first-order reasons were expected to be structured by perceptions of value and so the exploration of these could (maybe) provide information with regard to research question 1. The second-order reasons were expected to relate to the way work was conducted (the design process) and specifically the management approach and thereby research question 2.

Often a design change happens for a lot of reasons. However, each design-change described in the TVD chart was only linked to one reason (cost, aesthetics, functionality etc) for each of the two overall categories (First- and Second-order reasons). This was done to simplify the data, but more importantly it provided the opportunity to link reasons-for-change with cost-impact. The rationale for making this link was to add some ‘significance’ to the reasons-for-change categories other than frequency – this was also a specific wish from the TVD-manager and the lean consultant and so it provided the opportunity to give something back to (some of) the ‘gate-keepers’. If more than one reason was ‘allocated’ to each design-change it would be impossible to distribute the cost-impact (of the design-change) back on each of the more specific reasons for change (e.g. aesthetics, functionality etc.). This simplification should be taken into consideration when looking at the graphs below.

A brief literature search revealed no useful pre-established categories for coding ‘reasons for design changes’. It seems that research on design changes mostly focus on causes for unexpected and/or ‘bad’ (costly) design changes, which forms the basis for a bulk of change management literature. It is, however, appropriate to mention the work of Othman et al (2004, 2005), who set out to investigate the drivers for brief development (see chapter 5.2 on briefing). Nonetheless, while they acknowledged the potentially value-adding mechanism in dynamic briefing, their proposed drivers seem mostly
to be negative-laden categories of corrections or adjustments (not improvements) due to different types of mistakes, deficiencies in management or changes in the environment (this observation is also made by London et al, 2005). More importantly their list of drivers does not make it possible to identify the different reasons for choosing specific alternatives (other than correcting mistakes and ‘upgrading facilities’). Thus, Othman et al (2004, 2005) do not distinguish between 1st order and 2nd order reasons.

Within the case-study project, changes were encouraged as part of ‘optimizing’ the design. Accordingly, a more positive exploration of the value of changes was conducted (in relation to cost, aesthetics, functionality etc.). Grouped within the two overall categories (First- and Second-order reasons), these sub-categories were established by the author after having collected the data. Accordingly, the categories were based on the author’s (subjective) judgement of adequate representation of reasons provided by the interviewees (which was validated by the TVD manager in the second interview) as well as practical simplification. This is similar to a grounded theory approach, where categories are not pre-established, but ‘surface’ from the data. However, the aim is not to establish a ‘grand theory of reasons for design changes’, but to provide a simple overview of the reasons-for-change given by the interviewees (in this specific project) and specifically explore if the client’s or other project participants’ perception of value might be reflected herein. The ‘stories’, behind each of the design-changes, which form the basis for the categorization, can be found in appendix 4.

**First order reasons for design changes**

Chart 6.3.3.1 below shows the frequency of design-changes distributed on seven first-order reason-categories. Chart 6.3.3.2 shows the same, but it only includes the stories, which have been confirmed by at least one other source than the original. It can be seen that the two charts relatively show the same pattern: Category 3 (cost-savings) was by far the most frequent reason for choosing to make a design-change. In the following the categories will be explained.

The categories ‘Improved user functionality and/or maintenance’, ‘cost savings’, ‘styling’, ‘code requirement’ and ‘future revenue’, are more or less self-evident as reasons for choosing one alternative over another, whereas category 1 and 5 need further explanation. Category 1 (Quality in technical design) should be seen in relation to (and distinct to) category 2 (improved user functionality/maintenance) because sometimes the designers thought of something, which they – according to the interviewees – just found more ‘elegant’ from an engineering perspective without being able to point at any specific, apparent benefit to the users (Category 2).
1st order reason for change

Chart 6.3.3.1

1st order reason for change (based only on 'stories' provided by at least two sources)

Chart 6.3.3.2

1. Quality in technical design
2. Improved user functionality and/or maintenance
3. Cost savings
4. Styling
5. Meeting program requirements
6. Code requirement
7. Future revenue
As an example the TVD manager explained why they chose to experiment with having an intermediate floor for the central utility plant (instead of having it on the roof):

“We had to try it out because the designers thought it would be a better design, because pipes and ducts could be distributed in a better way. From an engineering point of view it would be a more elegant design.”

Accordingly, one could also term category 1 ‘engineering aesthetics’. Category 5 (Meeting program requirements) covers design-changes that occurred in the process of detailing through which the designers realized that some of the program requirements (like a certain amount of square feet allocated to a certain function in the hospital) had not been met or some aspects of the program, which had been more or less consciously postponed, should be added.

However, these reason-categories (1 and 5) were not frequently mentioned as primary reasons for design changes. On the other hand, this does not mean that these reason-categories with a low frequency of ‘instances’ were insignificant. This is illustrated in chart 6.3.3.3 and 6.3.3.4 below, where the reason-categories are linking to cost-impact. As it can be seen, the few instances of making a change because of ‘Future revenue’, ‘Meeting program requirements’ and to a lesser extent ‘Quality in technical design’ have added substantial costs to the project.

As an example ‘future revenue’ is a reason-category with only one instance, but a huge cost-impact. This category accounts for a design change where a whole extra floor was added to the building, because the client organization found that it had to include more scope in order to provide the service necessary for the business to work. The TVD manager explained:

“At first this was a 1.4 M square feet facility (and was only the programme space). Then they [Sutter Health] took all the non-essential programme facilities and decanted them into other facilities, but Sutter Health took too much programme out of the Hospital in relation to what CPMC needed in order to operate their facility the way they wanted to. [...] So this was defined as added value, which the team cannot be penalized for the owner making changes. About 45.000 SF was added as shell space, which was estimated to about 20 M.USD, so our target costs went up with the exact same amount”

This quote also illustrates the dynamics of interests among the parties who constituted the client.
1. Quality in technical design
2. Improved user functionality and/or maintenance
3. Cost savings
4. Styling
5. Meeting program requirements
6. Code requirement
7. Future revenue

**Chart 6.3.3.3**

**Cost impact linked to 1st order reason for change**
(based only on 'stories' provided by at least two sources)

**Chart 6.3.3.4**
A large portion of the cost-impact in the category ‘Quality in technical design’ is however associated with the proposal of having the central utility plant (CUP) at an intermediate floor. Within this category, the ‘change’ accounts for $10M, whereas the savings from moving it (back) to the top of the roof (-$10M) have been assigned to another category (Category 3 - Cost-savings).

Essentially, if the CUP had been designed on the roof top from the beginning (as the TVD-manager explained), nothing would have happened with regard to cost other than an alternative solution had been on the table for some time. Consequently, if this event had not been included, the ‘Quality in technical design’ category would represent overall savings (instead of an increase) and the cost-impact of category 3 would be less.

The A3 reports provided in some cases valuable information as supplement to the interviews. Looking at the A3 reports separately and only focusing on the change proposals, which are concerned with the product (not the administrative process, trade-partner selection etc), a similar categorization resulted in the frequency chart (6.3.3.5) below.

![Chart 6.3.3.5](chart.png)

There are three distinctive features to consider when comparing this chart with the charts presented above. First of all, it can be seen that an additional category has been added, which include the change-proposals that were brought forth because of a (at that time) newly made decision about LEED (sustainability) certification of the hospital.
However, this initiative had not resulted in any real changes in the TVD-chart and so this category was not included in the charts presented above. Secondly and more importantly, more than one first-order reason (cost, aesthetics etc) were counted for most of the (A3) change proposals. The rationale for doing this is that cost-impact is less certain in these reports because many of them were not approved or realised at the time.

In addition, there are examples of reports which had been approved with a comment/condition from the core-group that the proposal should be realised without any cost increases although the designers had predicted a cost increase in the A3 report. Consequently the first-order reasons assigned to these A3 change proposals are a mix of approved reasons and proposed reasons for making changes (which is the third distinctive feature compared to the charts above). Nonetheless, it can be seen that category 2 (improved user functionality / maintenance) surpass the cost-savings category although this is still a prime reason for suggesting a design change.

In comparison to the charts (6.3.3.1 and 6.3.3.2) that represent first-order reasons for actualized (TVD) changes, this may indicate that many changes, which adds improved functionality and/or maintenance, are (almost) cost-neutral and are therefore not ‘captured’ in the cost-oriented TVD-chart. Alternatively or supplementary it may be indicative of a strong focus on cost in the final decision making process on design change proposals. The latter is supported by an supplementary analysis of the 67 product oriented A3 reports, which shows that even though there were more (22 in total) design change proposal, which suggested cost increases (but improved functionality, aesthetics etc.) as opposed to cost-savings (16 in total), the percentage of approved A3’s were...
greater for design proposals with cost-savings than for proposals suggesting cost-increases (see chart 6.3.3.6). However, many of the rapports were still being evaluated at the time, when these data were collected, and so the ‘cost-increase A3 reports’ may have gotten approved subsequently.

**Second order reasons for design changes**

The second-order reason categories which ‘emerged’ from the data are listed below in chart 6.3.3.7. The chart shows the frequency of design changes assigned to each category. As described earlier, these reasons (for design changes) aim to illustrate why the design-change was considered (e.g. business plan revision) – not why it was chosen (e.g. future revenue). As it can be seen, more categories have been established for the second-order reasons than for the first-order reasons. This may indicate that the reasons for considering changes in the first place were more diverse than the reasons for choosing to make changes, where cost-impact seems to have been the primary driver.

The chart shows that, according to the interviewees, a lot of the changes emerged from plain detailing and refinement of design (assumptions) and estimates (category 1-3). This observation was confirmed by several interviewees (cf. R1, R8, R13, R14, and R7). Specifically the structural cluster-group leader said:

> Structural cluster-group leader: I think design generally is a series of assumptions and you always keep refining them...

However, the relative dominance of category 2 (refinement of design/assumptions) is less, when only considering the change-stories, which have been based on more than one source (Chart 6.3.3.8). In general, Chart 6.3.3.8 reveals no real pattern as 20 design changes have been distributed on 10 different categories. These categories will however be presented in the following.

Category 1 ‘overall design review’ includes changes that have derived from official design-review packages, where the designers have examined the existing design to find ways of optimizing it. To some extent category 1 is a mixture of category 2, 3, 4 and 8, but includes changes that could not be assigned exclusively to any of these four categories.
2nd order reason for change

1. Overall design review (refinement of design and estimate with tradepartner)
2. Refinement of design/assumptions
3. Refinement of estimate (no design changes made)
4. Trade-partner on board
5. Client-designer communication
6. Exterior requirement/change of code
7. Business plan revision
8. Trying out alternatives
9. Exterior opportunity
10. Innovative thinking (success or no success)
11. Commitment to achieve savings
12. Project phase (Tenant improvement)

Chart 6.3.3.7

2nd order reason for change
(based only on 'stories' provided by at least two sources)

1. Overall design review (refinement of design and estimate with tradepartner)
2. Refinement of design/assumptions
3. Refinement of estimate (no design changes made)
4. Trade-partner on board
5. Client-designer communication
6. Exterior requirement/change of code
7. Business plan revision
8. Trying out alternatives
9. Exterior opportunity
10. Innovative thinking (success or no success)
11. Commitment to achieve savings
12. Project phase (Tenant improvement)

Chart 6.3.3.8
Category 2 is exemplified by the TVD manager in the quote below:

For example with elevators, once we knew that we did not have an extra floor to go through and we knew that the woman’s and children’s floor were at floor 6, 7 & 8 and all the rest of the [elevator] towers were on the other floors, we could better define the elevator requirements. There may be a couple of 100,000 USD in elevator savings just by doing that – for example 300 feet/min elevators instead of 500 feet/min elevators and provide the relatively same level of service. We could do that after we had fixed the program.

This illustrates the interdependence of design tasks and the process of coping with a few aspects of the design problem at a time (cf. chapter 4.2). Instead of describing it as design-changes one could term it ‘design-evolution’ (at least for category 1 and 2). Accordingly, to the question “Why do changes then occur…I mean in your general experience with this project?” a project engineer and estimator for one of the structural trade-partners answered:

Trade-partner project engineer: So there was…a certain parameters we started out with and we started with the structure…probably MEP systems…most everything we thought as a good basic assumption for what is a likely conclusion for the design. So we started there. Then we had the ability to analyze it more in detail and look at options. At validation we looked at options. But now we are looking at options in a little different detail.

Some of the refinements came from formal design reviews (category 1), which often were associated with the inclusion of a new trade-partner (category 1 and 4). It seems that ‘new eyes’ often provided the seed for changing/refining the design (cf. R3, R7, R1, R10). This is illustrated with the following quote (which has been validated by the trade-partner):

TVD manager: At first the entire basement was a (site-poured) concrete structure and the concrete trade-partner said, even though he would lose profit, that it is about the same cost to go from concrete to steel in the parking structure, but it is faster to use steel. It will probably save a month in the overall schedule…

This also illustrates why it is important to provide incentives for suggesting design-changes even though it reduces the scope of work for the person/company who suggests it.
The overview of Second-order reason categories also illustrates that a change in the TVD-chart does not necessarily mean a change in design (category 3). This is exemplified with the following citation of the electrical contractor’s senior estimator:

Senior estimator: The preliminary estimate of the generators (genset) was based on a prototype (use of new technology) and since then the price has dropped...The gear went down a little bit because they understood it better – and I had my contingencies and they had their contingencies, so we made that go away...

Consequently, some of the savings came from elimination of contingencies as the trade-partners and vendors became more confident about the product/deal (this was confirmed by R7 and R9).

Escalation is another factor reflected in the TVD chart which does not involve any design-change\textsuperscript{29}. Accordingly, the financial crisis is likely to have had a positive impact on the TVD-curve, but it cannot account for everything. There are a lot of examples of other reasons for the downward trend as with category 5 (client-designer communication), which is exemplified below by the TVD-manager:

In the state of California, there is a code, which demands a certain level of training of maintenance personal if you use large boilers as well as a higher degree of emergency personnel. So usually engineers specify (several) smaller boilers, which are more expensive, but can be handled with less training and with less personnel on the job. But as the MEP team talked to the owner, they found out that the owner has – as a standard – personal with that kind of training. So it was a matter of communicating with the client.

This specific change could also be catalogued in (a sub-category of) the ‘Refinement of assumptions’ category. However, this ‘client-design communication’ category was established because of the specific research focus on client communication. Another example grouped into this category was provided by the TVD-manager:

“At the loading dock the client’s requirements changed. They had a requirement of a full size 18 wheel semi-truck to provide deliveries – and not just one but two or three of them in the loading dock area. And this requirement was not there at validation. At that point they were going to use smaller trucks, so when they came back with this requirement, we took a column out and put in a

\textsuperscript{29} These changes in estimate have not been assigned a first-order reason category given that no design change has been ‘chosen’
big girder over the loading dock and instead of penalizing the team they funded the extra (about) 750,000$.”

Again one could choose another categorization like ‘change in client needs’, but in this case it seemed more ‘neutral’ to call it client-designer communication.

Category 6 (Exterior requirement/change of code) is to some extent self-explanatory, but it includes an interesting story provided here by the TVD-manager:

_We were testing exterior wall designs […] Curtain walls are about 30-40% more expensive than almost any other standard economical material we could put on (other metal panel systems or precast concrete). The planning department of the City of San Francisco wanted a building exterior with a little more sparkle (more glass) to make it fit with the surrounding buildings. Functionally this is a waste of expensive materials because you can only see through a very little part of it. It works well with office buildings, but in hospitals you got so many utilities that cannot have so much window space. It was also something that the Smithgroup would like to try, because it has a more modern look than metal panels or precast concrete exterior façade. Also, the city planning department would like to heighten the appearance of the neighbourhood, which is something that this building can do._

This example is illustrative of the opposing views among stakeholders that designers sometimes have to deal with. However, in this case the architectural designers were partly instrumental in promoting the change – this will be dealt with in more detail below.

Category 7 (Business plan revision), category 8 (Trying out alternatives) and category 9 (Exterior opportunity) in chart 6.3.3.7 are more or less self-evident, whereas the last three categories (10, 11 and 12) are explained in the following.

Category 10 (innovative thinking) is highly subjective. When asked, the interviewees did not seem to have a clear and consistent understanding of the notion of innovation. One person said that there was a “ton of innovation” going on (re R2), whereas others said that it was an innovative (lean) process that led to many improvements in design, although the design-solutions, seen in isolation from an industry perspective, were not that innovative (Re R8, R9 and R10). Was the reason for the design-changes then innovative thinking? It was decided to only include three stories in the category. These stories were chosen

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30 The stories behind the categories can be seen in appendix 4
because they seemed to have resulted in innovative design proposals. The solutions were classified as innovative first of all because the interviewees classified them as such and because the designers, by proposing these solutions, challenged established norms in the industry.

The most obvious example of an innovative solution was the use of an alternative structural system, where ‘Viscous Wall Dampers’ (VWD’s) were used to absorb seismic activity. This technology originates from Japan, where it is used in high-rise buildings, but it had never been used in the US before. In the hospital project it was suggested by the structural engineers, who knew about this technology and wanted to explore it as an alternative option (which the owner approved). Afterwards, when they had settled on this solution (which included a lot of testing and documentation to the authorities) it had – at the time the data was collected – resulted in substantial savings in estimates (when compared to the initial and conservative base-isolation solution).

The other two design proposals in this category were less successful. One was a proposal to use an alternative way of fitting plumbing pipes together, which would give substantial savings in construction site assembly-time. This proposal was turned down by the authorities, with reference to potentially greater risk of bacteria because of a rubber packing (re R10). However, this does not explain why it was not allowed for e.g. hot water pipes. Another proposal was to completely leave out OR-humidifiers because calculations showed that they would not be needed. So the innovation was to actually leave something out that usually would be included as a standard. This was also turned down by the authorities with reference to the code (re R2).

Category 11 (commitment to archive savings) only counts one instance and was coined by the TVD manager based on the following description:

*TVD manager:* The ‘savings in electrical pipeline’ was because the electrical team was tired of the estimators always asking for cost estimates and savings every week – so they suggested to committing to find 4 M. USD in savings if they would be left alone. So, we left them alone. It was not so direct, but that is how it was.

This was backed up by a senior estimator from the electrical trade-partner, but was further elaborated in a subsequent conversation with the TVD manager:

*Researcher:* My interpretation would be that it may also be because Sutter Health’s funding of the project is constantly being evaluated in relation to the feasibility [viability] of the project – so this may have been a part of the strat-
egy to show everybody that the cost are going down, so you should keep supporting this project...

TVD-manager: Yes, okay, what you are saying is accurate. Not everybody was comfortable doing it that way right. They, [the electrical trade-partner] committed to do it this way.

So one could argue that this category should be termed ‘pressure to show cost savings’, but the electrical trade-partner’s senior estimator also chose to formulate it as an act of commitment:

Senior estimator: Even though we were 4M above our target we committed to save 4M. We were not sure how we were going to do it, but because the way everything else was working and the way this team was working...

Category 12 named Project phase (Tenant improvement) also only count’s one instance which is explained by the TVD-manager in the following quote:

It [Tenant improvements] is a term not often used in Hospitals. But in office buildings you often see that the owner just provides the shell of the building, which is leased to the users. Then the tenant comes in and says where all the interior walls should be build, so this is a term we use in the US for all the interior finishes. So this the moment when the owner actually funded this interior design, so the team is not penalized for including $20M of interiors (it had been on the drawing board for some while).

So this one instance was linked to a (expected) cost-increase of $20M. Accordingly, when linking the Second-order reasons-for-change categories with cost-impact (chart 6.3.3.9 and 6.3.3.10 below), it can again be seen that a low frequency (chart 6.3.3.7) does not equal insignificance (with regard to cost-impact).

The client initiated tenant improvement and business plan revision, which resulted in the extra 14th floor and added substantial cost increases. These two ‘design-changes’ had then (almost) been balanced out by a whole range of incremental refinements in design and estimates, which provided cost-savings. Some of these savings could probably have been assigned to the innovative thinking category or specifically the Viscous Wall Damper solution. As the structural engineers became more and more confident with their calculations they reduced the amount of VWD’s and structural steel – this is both a refinement of assumption, but can also be ascribed to innovative thinking.
1. Overall design review (refinement of design and estimate with trade-partner)
2. Refinement of design/assumptions
3. Refinement of estimate (no design changes made)
4. Trade-partner on board
5. Client-designer communication
6. Exterior requirement/change of code
7. Business plan revision
8. Trying out alternatives
9. Exterior opportunity
10. Innovative thinking (success or no success)
11. Commitment to achieve savings
12. Project phase (Tenant improvement)

Chart 6.3.3.9

Cost impact linked to 2nd order reasons for change

Chart 6.3.3.10

Cost impact linked to 2nd level of reason for changes
(based only on 'stories' provided by at least two sources)
The pattern is a bit different when only considering the stories that are based on at least two sources. Again the 20 stories are distributed on 10 categories and so it is hard to point at any trend. The tenant improvement story was only provided by the TVD-manager and so it is not included in the graph.

6.3.4 Analysis: Effects and problems with regard to the lean approach

In general the interviewees described the management approach on this project as something with a real positive impact. Most of them felt as if they were part of a cutting-edge experiment. This is exemplified with the following quote by a senior estimator from the electrical trade-partner:

Senior estimator: “It has been the best thing that has happened to me in my career”

In the beginning, there had been some resistance (R13, R9), but now most people bought into the new way of doing things. The project-participants’ enthusiasm about the concept, which can be said to be an effect in itself, was obvious in their frequent use of the special language (words and phrases), which is associated with lean: “reduce waste”, “optimize the whole”, “continuous improvement”, “lower the water to reveal the rocks”, “go slow to go fast”, “last responsible moment” etc. Commonly the interviewees (cf. R2, R3, R4, R7, R8, R12, R13, R14) emphasized improved collaboration and team-spirit as a direct consequence of the management principles used; the integrated form of agreement with shared incentives, the early involvement of trade-partners and particularly the co-location was highlighted as having a ‘positive’ effect. The interviewees to some extent spoke of collaboration and ‘team-spirit’ as a goal in itself (R3, R2, R4), but also linked it to the perceived success of the project. One interviewee (R11) considered the ‘integrated product delivery team’ as a pre-requisite for the TVD approach. Two interviewees (R3, R14) explained that the way the project was organized assured that people felt a greater responsibility to one another as well as the task. On the TVD-meetings, the success of the project was frequently concluded by the general contractor’s project executive and the owner representative with reference to the declining TVD-curve:

Project executive (PR): The project is a role model for the rest of the country, we take pride in that and that also keeps up the motivation – it is not only the money.

[Note from TVD meeting 10th of March 2009]
Owner representative: In 2005 we were 400 M USD over budget. If nothing had happened this project would probably have been cancelled [...]. This project will get funded for another year, where other projects are being stopped at the moment. It is a showcase in our organization. You guys are on the hero list. [Note from TVD meeting the 17th of March 2009]

These statements were met with enthusiastic clapping and nodding from the project participants. The TVD-process specifically was viewed as having a positive effect in keeping the project on budget. If the design was headed in a costly direction, the frequent cost feedback made it possible to jointly adjust the effort in good time (Re R14, R9, R15). One of the architects emphasized the benefit of being included in this ‘adjustment’ instead of the contractor performing a value engineering (cost-cutting) exercise separately together with the client (as it sometimes happens on other projects). The benefit of this continuous mutual adjustment, instead of throwing the design ‘over the wall’ for pricing, was also highlighted by the structural cluster-group leader. Other interviewees (R3, R2) pointed out that the TVD process entailed a greater awareness of cost and it therefore generated more ‘innovative’ ideas for cost-savings. Other interviewees argued that the TVD concept structuralized and organized the process of estimating and design development (R14, R12, R3), so it became more understandable (R3). Accordingly, a senior architectural planner, who had been working on the project for nine years (from the first attempt of retrofitting existing buildings and onwards), described the effect of the new management approach like this:

Senior architectural planner: Well, the principal thing that has changed is that there is a better management of the process with the owner [...] there is a core-group team represented by the individuals that I just mentioned that have...that are really evaluating those scope changes to the project. The additional wish-list items [...] that on a project this length and this complicated tend to add incrementally you know every other day or every other month you know millions of dollars to the project. So that was probably the one way that this project got out of hand these 3-4 years ago...there was no mechanism to really successfully evaluate if this can be incorporated into the project and whether it can be paid for. It was just the request...primarily by the owner...we would like this and this and this...

This analysis, of what went wrong in the former attempt, was supported by R14. Furthermore, when elaborating on the issue of changes he said:

R14: On our typical projects there are so many changes; some coming from the owner, some coming from...internally, some...its such a mishmash that you
lose track of what influenced what and what...how many dollars are associated with that versus...and it gets muddled and I honestly believe [...] some owners prefer it, because then they can feel that they can shove it down your throat because you can’t prove to them what they caused vs. what somebody else caused...so its just...they can hide behind that confusion and contractually hammer on you. Whereas now...let’s not try to confuse anybody, let’s not try and keep anything hidden. Let’s get it all out there in the open.

The frequent estimating together with the expanded pre-construction period, where time was spent to really detail (also through 3D modelling) and jointly re-examine the design was perceived to result in more accurate information and thereby less risk and greater ‘optimization’ (Re R14, R9, R7).

Consequently it seemed that the theoretical benefits of lean were realized in practice. However, within the lean spirit, the research was focused on ‘opportunities for improvement’. So even though the project in general seemed to be going well (the client and the majority of the project participants seemed very proud and happy about the project), emphasis in the following will be on various issues brought forward in interviews and meetings. These evolve around the bullet-points below and are mainly presented via excerpts of the interview transcriptions.

- Difficulty in establishing an open trustful environment
- Managing the client and user requests
- Different perspectives and perceptions of value
- The uncertainty associated with the initial setting of target cost
- Design progression and designer fatigue

It should be stressed that the interview-accounts presented below, only represent the individual opinions of the interviewees – not their affiliated companies. Also, as indicated above, the interviewees had in general a quite positive attitude towards the client and the management strategy in spite of their critical comments. One architect was relatively more critical towards the lean concept and was chosen as interviewee for this particular reason. Consequently, the statements below should be viewed within this intentional ‘fault-finding’ research strategy.

**Difficulty in creating an open and trustful environment**

The management approach entailed openness and sharing of information. The various professions and companies were not only to integrate their design and production expertise, but also share information about the associated cost, risks and the contingencies
which they carried. The management approach also entailed willingness to provide ‘best guesses’ at times when information was sparse. This necessitates a certain level of trust between parties. The trade-partners had to trust that their ‘best guesses’ would not be turned against them (if they were too optimistic) and that they could lower their (usual) build-in contingencies in their pricing based on the expectation that unforeseen costs would be compensated by the owner. This had been hard to accomplish and was a recurring issue when new trade-partners came on board (R2, R7 and R10). The way it was tackled, by one of the MEP trade-partners, was to have line-items in the budget called ‘design-progression allowances’ which functioned as ‘place-holders’ for increases in some specific design items (e.g. 50 additional light-fixtures) (re R10). In this way the contingencies were not distributed as a factor on all line-items, but assigned to specific parts of the design, which the trade-partner expected might change. This made the estimating more transparent.

Another part of the challenge is illustrated with an example: A3 report 101, about heat recovery and displacement ventilation, was approved (11 of April 2008) with a comment that the design proposal should be incorporated within budget, which meant that savings were expected in other areas (in the MEP cluster-group) to balance out the extra cost of this design change. R2 commented on this design change in the following quote:

R2: The barrier is that you have got to have trust that the owner is not going to burn you. So for instance the owner says: yes I want to have displacement ventilation as part of the design criteria for the job. It is an innovative idea that is brought forth by Ted Jacobs Engineering group. Let us use displacement ventilation, it will be healthier for the patients and it will save you energy in the long run. But it costs 2.3 million dollars to implement. And the owner says: I want that and you have to trust that in the end he will pay for it. Because right now we don’t know how...he says: yes I want it but I want it for free. But he also says on the back-end of that if you can’t do it for free I’m still going to pay for it, so you got to trust that.

So, similar to the earlier example, where the electrical senior-estimator made a commitment to achieve a $4M saving (and incorporated the saving instantaneously in his estimate), the contractor needed to trust that the owner would cover the costs in the case that sufficient savings could not be achieved (and the ‘added value items’ were so ingrained in the design that they could not be undone). This may also be the reason why some companies were holding on to some of their contingencies, even though they were not supposed to (cf. R2, R7 and R8).
A third aspect related to the division of the overall target in budget targets for each cluster-group. R2 explained that you had to trust that team members would work towards the overall target, even though a design change, which would provide overall savings, would have a negative impact on their particular cluster-group estimate. Whether such a sub-optimizing ‘competition’ between cluster-groups had been a real problem was not made clear.

Managing client and user requests

The earlier example, about the adding of an extra floor, illustrated how CPMC and Sutter Health had not always been in agreement about what should be provided. This circumstance was supported by several interviewees (Re R1, R9, R5 and R13) and is described below by R13:

R13: Another barrier is just that, now the client…that we have Sutter as one client, who pays the bills and we have CPMC as the other client who we are designing it for and their values and their goals are nowhere near aligned, so one client is asking us one thing and another client is asking us to the other thing and we are like this illegitimate child who is caught in the middle trying to please both parents you know?

In addition, five of the interviewees (R13, R9, R8, R15 and R5) expressed frustration about the user process. This is illustrated with the following quotes by three of the architects:

R9:… user groups. That has been one of the most difficult processes that we have had in designing hospitals. Hospital users…there is thirty or forty different user-groups, okay? They all have different agendas […] they are their own little castle, right?

R13: …new people [users] come on-board. They have […] new requests or they didn’t think of something before…or I mean there are a million different reasons why they change their mind.

R15: It’s a fire-drill I think that there are so many requests that come in to change…and there are so many…that’s the most difficult part of this projects is: who is your client?

Also, some user representatives were not really motivated to participate (R5, R13). A specific story about the user-process was provided by R8:
R8:...in a different case we are fighting...the users...we gave them a choice of A or B for the type of light that they are going to have in the patient rooms [...] and we wanted to choose A or B and they chose both. And “both” wasn’t the right answer, but “both” is what they actually claim they need. [...] So...you know...the users...it is their hospital and they are paying for it and normally I wouldn’t be in at this point, but I have talked to other hospital designers and executives from other groups and it is always the case...and the users change their mind a lot...

This topic was also discussed in a TVD meeting (the 31st of March) and is further elaborated by R5:

R5:...Our lighting designers actually provided an appropriate solution. [...] but the users didn’t want that solution, they wanted this other thing, so we [...] went through the CBA [...]. They [the core-group] said: Well, you have to ask the users. So we asked the users, do you want A or you want B. And users said we want A and B. [...] the core-group says: Well the users that is just their opinion, it is not a decision. [...] so, the core-group goes away, has informal conversations, comes back and says: “Well we will just do whatever they want to do”. Well what about the CBA process?

In the programme validation study report (page 11) a ‘value statement’ is provided of which an excerpt is provided here (See exhibit 6.3.4.1 below and appendix 6 for the full statement). One might think that this (as a sort of value tree) could provide guidance within the user-process.

However, to the question of whether this was used, the interviewees (R9 & R13) were unaware of the value-statement and began to speak of the (lean) “5 big ideas” shown in the picture 6.3.2.4 above (however, they recognized the value statement when they saw it). R9 said:

R9: Yes, these are not new. These are generally agreed upon principles. They are so high and lofty they practically don’t mean anything. You know what I mean. That is, what’s not to agree with? You know, everybody...if I showed that to anybody in the hospital, they would say: I believe in that.

This statement somewhat aligns with the attitude/opinion provided by the architects in case-study 1 in relation to the value-tree.
Coming back to the user process, another circumstance which frustrated the designers, was the fact that the users found it hard to give any preferences regarding hospital equipment (re LPS meeting 30th of April 2009), because the medical staff knew that their wishes would change concurrently with developments in technology (re R13, R10). Lack of decision making with regard to equipment, also made it hard to ‘right-size’ the MEP systems, which feed the equipment. In some areas the equipment cluster-group tried to build in (over-)capacity for future flexibility (re R13), but a concern was that the MEP systems would be designed for a worst-case scenario – this was not considered to be ‘lean’ (LPS meeting 30th of April, 2009). Therefore, the designers called for more involvement from the core-group. Another example, of user-induced changes, was provided by R2:

**R2:** User groups have changed the configuration of the third floor because they want the locker rooms closer to the operating room and so they swapped a whole bunch of things on the third floor, so the back-runs needed to change and it will effect our production schedule. So it was a late input back to the planners who then put it into the plan and it affects everybody’s work down the line…

**Researcher:** I guess at one point in time you say: now we can’t change it…?

**R2:** No, that is the problem that is the fallacy in the whole thing (!) At the beginning no one said: Here are all the appropriate requirements from an ultimate customer standpoint and here is how it relates to the design of the hospital and so forth. So there is no informed process. Because I asked [...] one of the planners, so do you think about this could affect the ability of the design team to get done on time? [...] He says: No I am not supposed to think about that. So far as I’m concerned it is transparent. So from a planner’s standpoint,
the guys that interface with the user, they could theoretically keep making changes up until the day the hospital is turned over.

This citation shows a tension between the contractor side and the architectural planners, which also became apparent on other occasions. Accordingly, on LPS-meeting the 18th of March 2009 a disconnection was observed between these two groups, which was confirmed by a statement (‘opportunity for improvement’) written on a flip-over that said: “Standard work process for handling changes to design in a way that facilitates coordination w/engineers and T.P.’s” (presumably it means “technical planners”). This will be further described in the following.

**Different perspectives and perceptions of value**

The notes presented in textbox 6.3.4.1 below were written in a TVD meeting (the 14th of April 2009) where the MEP cluster-group had made a presentation about the magnitude of mechanical design re-work associated with small changes in architectural design (e.g. ceiling height). The difference in perspectives represented in this excerpt may be ascribed to a difference in educational/professional background. However, it seems likely, that it also reflects the different tasks, which the MEP cluster-group and architectural planners were assigned and the way the project was organized in general (the organizational chart shows the architectural planners as a separate entity). This issue was discussed with R2:

`Researcher: [...] I have sensed...also looking at the organizational chart...that the Smithgroup is somewhat divided from the rest of the team to some extent or some of them are. What is that all about in an integrated project delivery team?

R2: It is wrong (laughs). We would be better off with a structure where the planning group inside of Smithgroup was not off on their own`
Textbox 6.3.4.1: Excerpt of notes from TVD meeting 14th of April 2009

Comment from the Architect: “Thank you – it was very clear. However, every time you said ‘change’ I think we said ‘refinement’” [everybody laughs].
He then asks a question regarding temperature in rooms. Then he points out that it is a two-way street – refinement of HVAC also affects architecture.

Another architect: “We are not finished and we still need to make changes...so we need to manage it.”

 MEP cluster-group leader: “The purpose is not to say we cannot make changes, it is just to show the impact of it and explain why there is a push-back when we are asked to consider changes.”

Architect (interrupts): “Yes – why is there a “push-back”...?”

 MEP representative: “we just need time to analyze things…”

Architect: “It is also important that you do not just say: “we can’t change the room height” – because yes we can, if we lower it in another place…”

The TVD manager asks what the impacts are on the budget for making small changes...

However, the difference in perspectives associated with different professions (contractors/ engineers and architects) is specifically described as an issue by one of the architectural planners:

Architectural planner: What I have seen in the years I have been working on this project, in this go-around, is that there was some budget out there and we had to hit that budget first, so there was the whole activity of every week driving cost down, driving them down, driving them down, to hit a certain budget. Once we were there, we had a list of value-added, I think they call them, items that we might factor back in, that is a very contractor and owner way of looking at things. [...] I don’t think we nit-pick it away in that same series of systems, I think...this is really coming forward in the interiors discussion, we went through an [Value Engineering] exercise and we are continuing to go through an exercise on acoustic tile ceilings, [...] The architects are going to look at the entire room [...] the architects are not just going to pick one tile over the other. [...] And they are not just going to: Okay now I’m just going to think about ceilings and make a decision and okay now I’m going to think about floors and okay now I’m going to think about the wall material and make a decision...
The architect referred to a Value engineering (VE) exercise where the researcher attended. In one of the meetings the notes below were written (see textbox 6.3.4.2), which were subsequently approved by the value manager (see also appendix 2 and chapter 5.3.3, which provide background knowledge of the VE method/rationality).

These notes exemplify the difference in perspectives. The design architect seemed estranged by the engineering logic of optimization (as in the above quote). Accordingly, some of the interviewees (R4, R9 and R15) spoke of the difference in ‘optimizing’ engineering systems (such as structure and ventilation) and architecture:

R9: …when you get into the subjective realm of colour theory or placemaking or shapes and forms materiality and what it makes you feel, how it might effect your perceptions, it is much harder to quantify those in a one over the other. When an artist or musician creates music he doesn’t go to a chart and say: well I think that note is better than this, when I compare that. He might in his head intuitively know: if I do this it sounds better, it is just right, it is just there. So formulating or creating a formula for every decision in an architectural practice like this or an integrated form like team like this, is not going to be successful. Probably doesn’t apply and I’m not sure that the CBA has been used or attempted to be used to get to those issues and maybe appropriately so.

Likewise, a design architect said (when asked about potential downsides to the process):

Design architect: I think the down-side…one down-side as a designer I feel what you are told about the cost as one of the factor is sometimes to me a downside, because everything is...sometimes I feel is judged based on the cost, because you cannot put value on aesthetics. If I say it looks great and if I don’t have a number to prove behind it. If the numbers are saying: the other way around…”Yes we get it, looks great, but it is two million dollars for this”, then I feel that I have no ground to argue that.

[...]
we think of buildings as 150 or 100 years time-line […] there is a certain obligation it has to do in terms of sustainability, in terms of the urban context of San Francisco, in terms of the architecture, what’s happening in the world. And sometimes I feel like the cost is the only thing that is looked upon as a judging factor.
There are seven participants attending the meeting. The value-manager explains that the costs of different ceiling alternatives are to be assessed with regard to the functions of their components. The value manager explains how the cost of the “appearance” of a tile was determined on a former meeting via comparing it to the cheapest tile available that had the same physical performance. Three architects look at each other with concern. The value manager explains immediately that this was only to determine the cost of “appearance” - not to suggest the cheap tile.

A GC project engineer asks whether the function “acoustical performance” (NRC) makes sense without considering walls, carpets etc. This spurred a discussion. The value manager ends the discussion: “this is not to be discussed until the creative phase”.

They realize, that in one area of the hospital an expensive tile is used (in the current estimate) with a superior acoustical performance. They realize that they don’t need it and a cheaper (but high end) tile can be used. Then they discuss a different type of ceiling (Techzone), where comparison is difficult because “boards” are used, not “tiles”. An architect says that this type of ceiling, in this area, was chosen partly to ease access above ceiling. However, the value manager states that a cheaper ceiling can provide the same “accessibility” and therefore some of the cost should be assigned to “appearance”. Then they discuss what type of ceiling is more “easy to access”. According to the value manager the distribution of cost on “ease of access” and “improve visual appeal” depends on the design intent.

The architects present are not the design architects, so they call the designer. He attends the meeting. The value manager sums up the distribution of cost to functions and asks the architect: do you agree to this distribution? He answers: “I do not know how to answer that”. The value manager explains the reasoning behind the method. A person asks if some of the cost in “improve visual appeal” should be assigned to the “project professional image” function of the ceiling. The design architect says: “I don’t know how to equate that”. They discuss the difference between “professional appeal” and “visual image”. The value manager and a GC project engineer decide on a distribution of cost to functions and moves on adding numbers to the spreadsheet – mostly by talking to themselves. Two hours have passed and the architects leave.

The value manager says: “we lost the rest of the team and it is the problem with this part, it wears people out…”

Textbox 6.3.4.2: Excerpt of notes written at interior cluster-group meeting during a value engineering exercise (the 22nd of April 2009)
Specifically with regard to the discussion about the exterior façade, R9 said:

R9: you might say that you could weigh those things fairly easily at least – if not the performance criteria – at least the cost […], but when you look at pre-cast concrete building as a photograph or an illustration and you look at some other building material type – glass and metal for example – I think it can be spoken about in terms of the qualitative differences, that call for a fairly sophisticated individual or individuals to describe the feeling or the appearance of those things and how they work. I think the other thing that has helped us in that regard in that particular example was the entitlement process. The City of San Francisco has a lot to say about materiality.

Researcher: And you are smiling now (laughter)

R9: Yes, and it wouldn’t be the first time that architects would use the entitlements process or at least understand it in a kind of…skew the client towards what is…you know I’m not saying this cynically, what is the bigger picture. And the bigger picture is not just what you are building in the middle of the city it is how that building along with other buildings on the block or in that district or in that area comprise an architecture or an infrastructure and that needs to be evaluated in a larger context.

The latter quote may be compared to the interpretations provided in the previous case-study, where the city-architects office also played a major role in design discussions. Accordingly, this brings up another topic about the client and the designers potentially differing perceptions of value, which may be due to differing frames of reference (cf. chapter 4.1). R12 said:

R12: the people that are defining the budget are not the people that are creating the building and the values that infuse the building creation come from the hearts of the people that are designing it, right? […] And hopefully what happens is that you are helping educate your client and they are educating you at the same time as the project moves forward.

In addition, R13 said:

R13: How do I define it [success in a project]? Um…meeting the objectives of the client. Which is meeting their values and…so the values is one thing for CPMC…the budget is for Sutter, that’s how I view it at least, and then aes-
Another example, of how different opinions among professions are reflected in design development, was provided by the HVAC trade-partner estimator. He explained how an acoustical engineering consultant had recommended vibration-dampening spring-hangers to all mechanical piping, which would add substantial costs. The trade-partner’s estimator thought it was a waste of money (as did the client) but adhering to the decision-making process an A3 change proposal was made. The analysis in this report was summarized to:

Our current design meets industry standards. [Name of] acoustic engineers recommends installing additional resilient supports resulting in an increase cost of $960,028

The only advantage listed was “Slightly more sound and vibration isolation”. In comparison to other A3 reports, this argumentation was quite thin and it appears that the authors did not approve of their ‘own’ suggestion. Thus, it gives the impression that the A3 report, which is supposed to provide objective (quantifiable) grounds for decision making, was heavily influence by the sceptic viewpoint of the trade-partner (and cluster-group leader). Correspondingly, R13 commented on the Choosing by Advantages (CBA - see chapter 5.6.1) approach for decision-making (which was incorporated into the A3 reports):

R13: But I think that at the end of the day you might have like ten people giving information into a CBA analysis, but it’s really one person who is working on it, its one person who is tweaking the numbers. And if you look at it...um...its so much analysis it’s really one person doing it at the end of the day and it can so be tweaked. [27.51] You know what I mean it just like statistical data at any point you can use that to your advantage or disadvantage right?

Researcher: Yes and you choose what factors to put in there and you can leave out factors if you want...

R13: Exactly, so that’s how we feel. Sometimes you might leave things out or put things in that aren’t really necessary...

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31 Value manager (when reviewing draft analysis): Did R13 have CBA training? He/she seems to make remarks that indicate a lack of understanding. It is not one person working on it and tweaking numbers.
Also, R15 expressed concern about the CBA process because it was difficult to ‘prove’ the value of aesthetics. Also, aesthetics as a ‘factor’ was often in ‘minority’ because the majority of participants in CBA sessions were usually engineers and contractors, who emphasized cost and functionality. The value manager confirmed that decision-making via CBA was (still) subjective, but it provided structure to the process and made the grounds for decision-making transparent. In addition, from a sense-making perspective, the implicit effect of ‘structure’ is that it reduces and organizes the large stream of information and thereby enables the participants to act (see chapter 4.2). This is critical for moving the project forward.

However, coming back to the tension observed between contractors and architectural planners, a senior architectural planner explained:

> Senior architectural planner: It emerges primarily on who is driving the process. The...um...architects want to create very high value in the buildings and high function and...um...the target...the engineering team primarily end-builders want to create...they also want to create high value, but they are probably much more in tuned to the cost of their particular silo of design. Okay? The architects need to relearn the lesson here on who are they designing for. They are not designing for themselves. They are designing for the owner.

Accordingly, this can be understood as a power struggle and a struggle over differing perceptions of value (not only designing rationality). Regarding the former, three architects (R15, R13 and R9) stated that architects had lost power within this approach, because they traditionally have been the leaders of the process, whereas on this project they were ‘equal’ to every other team member and had to confer with everybody about every decision – not least the owner. This spurred some resistance. Interestingly enough, they were all in favour of the management philosophy. Furthermore one may understand the tension as an effect of different sets of values (in plural) associated with the different professions. Accordingly, R4 emphasized how different priorities associated with different professions sometimes clashed:

> R4: [...], it is a high challenge to get the practical side of the trade-partner and this more aesthetic side of the architect together and then agree on something...that they...they are fine on both sides...that is quite challenging, [...] they are like two worlds clashing sometimes...

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32 Notice how this aligns with the observations/interpretations made in case-study 1
Especially one of the interviewees (an architectural planner) suggested that the ‘contractor side’ was too focused on immediate cost-savings and getting to target:

Architectural planner: So a lot of times on the architecture side when we sit in these meetings with everyone and we are told you have to meet the budget, you have to meet the budget, you have to meet the budget by one of the major trade-partners or subcontractors, my responds is usually: You are right, we have to meet the appropriate budget, but just because I have been handed a budget, I’m not necessarily going to accept that it was the appropriate budget. [6:32] […] Now that being said we are not trying to waste money[...], but we are willing to challenge it, if we don’t think it is enough money to do the job properly.

In addition, R13 said:

R13: And different values are sometimes related to different teams, right? […] a part of the team doesn’t really want to focus on the budget. They want to focus on the materials and how the…you know people are going to perceive the […] finishes and probably couldn’t care less about the budget, you know? […] …there are definitely multiple voices within the team.

The notion ‘the appropriate budget’ mentioned above leads to another issue about the uncertainty associated with the initial target setting.

**The uncertainty associated with the initial setting of target cost**

In continuation of the above quote, the architectural planner said subsequently:

Architectural planner:…on the architecture side of the equation there has been several difficulties from our perspective. One is the initial budgeting that was either by the owner or by the contractor was benchmarked against things that we may not have agreed were appropriate benchmarks. [27 minutes later] Architectural planner: I think that, I don’t know that the architects are unwilling to say that, but I don’t know if the client is hearing it. You really don’t have enough money to do what you are trying to do well...at this point in time.

The architectural planner argued later that the extended pre-construction phase (together with the two previous project-attempts) could be seen as an affect of the target being unrealistic. Similar another architect said:
R13: So we feel like we are stuffing as much as we can most efficiently...but sometimes most efficiently isn’t the best way. [...] they are going to grow out of the building quicker...but in order to get the building build, you only have so much money and you’ve got to get all this stuff into the building, right? But by the time it gets build they are going to outgrow it already.

Without questioning the overall target, three other interviewees also suggested (separately) that the initial targets for each cluster-group should be revised to reflect the latest design progression (R3, R2, R15). Likewise R9 said:

R9: I think that one of the problems or one of the challenges with TVD is setting the target. How is it set, what is it based on? [...] what the architectural team did not have high degree of confidence [in] from the very beginning was the target value...the target value for interiors. So the question from the architects on the interiors side was: How was that arrived? How did you get to that number?

In addition, the exterior enclosure cluster-group leader thought it would be impossible for his group to reach target because the facade had changed from pre-cast concrete to curtain wall. Apparently his group had not been fully ‘compensated’ in their budget for this change. This may be seen in connection to the example above, where the owner had approved a change, but expected that he would get it ‘for free’ due to expected cost-savings. Consequently, after the initial findings of the research had been presented to the GC project-executive, the budget-targets for the cluster-groups were re-set, but the overall target remained.

To some extent, this discussion, about the initial target setting in relation to scope, seems to be a matter of aligning expectations. This came up subsequently in the conversation with the architectural planner quoted above:

Architectural planner:...and that’s the problem I think from the design side – we haven’t made the determination whether it is a T-shirt or a ski-jacket yet. And yet we are being held to a price-point that may really be a sort of a suitcoat of not very good quality...

Likewise, R15 said:

R15: the only reason why I think it [TVD] can be improved is...a very clear definition of the expectations from the client side of the project.[...] If I only
want to spend 10,000 dollars and I want the most recent Mercedes SE series then maybe I’m not being too realistic about it. […] The design has to be integrated very early on – we have to know what expectations are, so we understand when we (are) designing it.

Design progression and designer fatigue
In continuation of the issue about aligning expectations, two interviewees (R11 and R5) expressed frustration about an ‘added-value list’, which the client introduced at the time the interviews were conducted (in the detailed design stage). This list included a range of additional wishes, which the client/users would like to incorporate. The list, with an estimated cost-impact of $70M (re TVD meeting 10th of March 2009), had accumulated over a period of time and was introduced because the overall estimate had come below target. However, R11 thought it would be almost impossible to incorporate these items (at such a late stage) and still keep the budget. In addition, the added-value items would be ‘baked into the cake’ and it would therefore be difficult to retrieve them at a later stage (in the case that sufficient savings had not been achieved). R11 said:

R11: Well, from here to here it was motivating [points at the early part of the TVD-graph, where it has a relatively steep decline], from here to here it gets monotonous [where it flattens out]…because what you have done is you have picked all the low hanging fruit here…so to speak

[About 8 minutes later] R11: I’m questioning that if you’ve been eliminating waste and you are right at your target value design budget, but you still have another 10% that you want…you know… I mean its…its already incorporated into the job they keep going a long and expect that…um…drop your initial…work down another 10% you know incorporate this…I think is…again when is enough?

In addition, one of the architectural planners was unpleased about the added-value items being ‘injected all of the sudden’ and was concerned that these additional design-items would be incorporated at the expense of the appearance and quality of the building. As in the above quote, other interviewees called to attention the different stages of design progression: The structural cluster-group had been working on their part for a very long time and had stopped reviewing their estimate every week, because no big savings were achieved anymore (re R14), whereas the interior cluster-group leader said that his group was only starting to find savings. This also connects to the earlier example where the electrical trade-partner committed to $4M savings; the senior estimator said:

33 The list was not included in the ‘change statistics’
Senior estimator: what happened is we got to this point and we were basically um…treading water because there wasn’t more information coming in…a lot of it…we were waiting for the mechanical to come in and you know...finalize their design so we could see it.

A related issue that was brought forward by R11 as well as other interviewees (re R5, R10) was: when to stop the design development process? In theory it could go on forever (you can always find more waste!), but it may lead to another issue, which was exemplified with the above statements about the added-value items: Designer fatigue.

When designers have spent a lot of time and energy getting to target, it may be hard to accept that they have to ‘start over’ with new value-added items. Also, the collaborative approach entailed a great deal of information processing and time spent in meetings (R14, R10, R4). The risk of exhausting the designers in the prolonged optimization process was apparent in the following quote by R5:

R5: …in this experience on this particular project it seems that we have to go back and revisit everything that has already been considered and accept it or reject it...in the whole acoustic tile ceiling process, every time a new person is added to the cluster-group [...] we have to [...] bring them up to speed, so to speak, let the them go through their education and learning curve and it is exhaustive [...] So I think that the designers are feeling very frustrated that, you know, [...] we have already discussed it [...] we have already re-drawn it 14 times, why do I have to come back and talk about that same thing again? Where was that person? Or let’s not let them put on that aspect at this point in time. We need to move on....

This may of course also relate back to the issue about power or the architect may perceive the review process as indicative of lack of respect in her professional expertise (clues to the latter were found in other parts of the interview). A more positive view on the prolonged pre-construction phase was provided by R2:

R2: It is hard work, absolutely. It is exhausting, but at the same time it is exhilarating. Because we are always trying to figure out how to do it better faster for less money it is a way of thinking about things always. But yes it is exhausting and tiring...

However, R2 together with R7 called for more dead-lines and ‘freezing of design’. This may relate back to a genuine concern about spending too much money in the pre-
construction phase, but it also seemed to reflect an urge to move on. Finally, one may interpret the earlier mentioned frustration, about (user-induced) changes, as a symptom of a growing exhaustion among the designers. As the senior architectural planner said:

Senior architectural planner: Listen, I have been involved with this project for 9 years. I want the damn thing built – and you can quote me on that!

It should however be noted, that he was all for the lean approach and thought it had moved the project closer to construction.

6.3.5 Meta-theoretical reflections

Hermeneutic inspired interpretation

Source criticism

From a source-critical perspective the interviewees can only be regarded as narrating sources on the subject of ‘real’ reasons for cost-changes in the TVD chart. The stories are likely to have been influenced (distorted) by the interviewees’ post-rationalization of the events. As an example, the story about the electrical trade-partners ‘commitment to archive savings’ can be understood as ‘moral storytelling’ (Alvesson, 2003) influenced by a normative pressure to promote the management (lean) approach and avoid interpretations that are indicative of a harsh top-down pressure to provide (display) cost savings. However, this specific interpretation was presented to the two interviewees (the TVD manager and the electrical trade-partner estimator) who acknowledged it, but maintained their viewpoint. For this reason their perspective was preserved in the categorization of the story.

In addition, when looking at the statistics, the ‘refinement of assumptions’ category may be critiqued for being a rather vague ‘one-size fit all’ category that may have been constructed to make sense of the interviewees’ ambiguous recollection of events. Thus, the time-span between the occurrence of the changes and the interviews, is a general concern with regard to validity (critique of distance). However, the specific ‘refinement of assumptions’ category fits well with the descriptions of architectural designing by Schön and Lawson presented earlier (chapter 4.2). Furthermore, the relevance of this category was specifically confirmed by five interviewees (and was not rejected by any). Accordingly, the (source-critical) principle of exploring more than one source was applied to the extent it was possible; hence the charts that only include changes that have been described by more than one source. Especially the (approved) A3 reports are valu-
able in this respect because they are remnants of design-changes actually taking place. The A3 reports are also ‘closer’ to the occurrences than the interview accounts.

As anticipated, the different sources sometimes revealed many layers of ‘reasons’ and ‘effects’ associated with each design change. In spite of the obvious benefit of these diverse perspectives, a ‘downside’ to this was a great difficulty (and consequently researcher subjectivity) in sorting out and categorizing the changes. The complexity is illustrated when digging further into the story about the central utility plant mentioned above. Thus, when exploring the A3 reports it seems that the location on the roof top was associated with other expenses, which had not been captured in the statistics presented above. According to A3 report no. 18, there was a need to build an enclosed space for the emergency generators, which added $2.4M in target cost adjustment (that was approved the 30th of September 2008). If the emergency generators had been located on an intermediate level, this expense could probably have been saved. However an alternative was provided in the A3 report, which suggested prefabricated, directly attached enclosures, with a smaller cost-increase ($300K), but this did not satisfy CPMC who wanted an enclosed space around the generators (a similar issue was raised regarding enclosed space around the air-handler units instead of roof screens on TVD meeting the 31st of March). The cheaper option, with directly attached enclosure, is probably the reason for calling the enclosed space a change in scope (and adjusting the target cost). The change was categorized as improved user functionality in the A3 statistics presented above, but might as well be seen as a consequence of the CUP placement. Also an adding/increase of roof screens can be linked to the positioning of the CUP. This is a change described in A3 report 87, which suggest an increase of $3.6M in target cost as "added value" (which subsequently has been adjusted to $3.2M according to the list of added value items included in TVD-meeting Agenda, April 14 2009). In connection to this, one of the (technical) architectural planners said:

*Architectural planner:*...when you put it [the CUP] on the roof in San Francisco, which is basically a marine environment you are going to pay enough charge for equipment that can withstand the salt spray, humidity kinds of components that are part of putting the equipment on the roof, not to mention it deteriorates faster. You are going to pay a cost, because nobody is going to look at this. San Francisco is very sensitive about this, so you start building screen walls around it. When you put screen walls people start to talk about the top of the building and then they want to light [it]. Then they have to have access to it. Then you got to position it on the roof in such a way that you can still get your [??] and get the window washing equipment around it and the guy still have to be able to walk up there. So all the sudden you spend all this money to kind of [??] the equipment and screen it in a way that’s aesthetically attractive.
The question is whether the cost-impact of the CUP should be adjusted for its (potential) derived effects and if the associated changes (roof-screens and enclosed space around emergency generators) should be categorized in a new reason-category named something like “consequence of another design change that was chosen because of its immediate cost savings”? Similar problems occurred when confronted with cost-savings in the TVD-chart that was associated with decreases in steel. These came out of (structural) design reviews, but often related to the Viscous Wall Damper solution.

In general it was decided not to adjust the cost-impact for any derived design-changes as this would be associated with additional uncertainty and potentially open up to an infinite mesh of connections between design decisions. In addition, the interviewees own ‘naming’ of reasons was generally used to categorize the stories, although other reasons were in some cases suggested by the researcher to challenge the interviewees initial representation (as in the ‘commitment to achieve savings’ example above). In addition the categories were presented back to the TVD-manager as well as the value-manager for commenting, which was instrumental in adjusting ‘researcher subjectivity’ in the naming of categories. However, this does not change the fact that the categorization of changes is inherently associated with simplification.

Regarding criticism of authenticity the researcher did not suspect any deliberate attempts to make up stories. In general the stories were often connected to a certain design-solution (or writing on the TVD chart) to which various factors or reasons might be (subjectively) emphasized, but it was nonetheless concrete design solutions, which to a certain extent spoke for themselves and limited the possibility of ‘creativeness’.

**Reflections on pre-understandings and research question 1**

The above analysis started out from a pre-understanding (hypothesis) that design-changes often occur because of (1) changes in the client’s perception of what is valuable or (2) the AEC-professionals lack of understanding of the client’s perception of value. However, when looking at the TVD-statistics presented above, there is not much support for this pre-understanding. Regardless of the uncertainty associated with the subjective ‘construction’ of categories, there are only two events that reasonably can be categorized as changes in client requirements: The adding of the 14th floor and the requirement for 18 wheel trucks in the loading-dock. In addition, if one includes the city as part of the client group, there are two examples of them giving strict demands, which were in opposition to what the owner wanted and which led to changes: the curtain-wall facade and the adding of screen walls.
In addition, when only looking at the statistics, it seems that changes primarily have been driven by an ongoing struggle to reduce cost – not because of new user-functionalities or overlooked requirements, which the client came to think of or had not articulated.

In general, it appears that most changes originate from the extensive and ongoing review process or ‘design evolution’. This can be understood as the designers incremental refinement of assumptions as various aspects of the design problem are considered one at a time. In a cyclic process the various aspects of design are developed and revisited again as new information and clarification come forward – a process that is likely to have been amplified in this project because of the front-loading principle. However, cost were a dominant criteria when considering design changes and therefore, when considering RQ1, it may be said that the client’s perception of value (viability) was manifested in design changes.

Inspired by the hermeneutic circle of enquiry, the various parts of the design problem were constantly related to the whole (a room, a floor or the entire building) that was reshaped by its parts and in return provided new meaning to the parts. An illustrative example of the latter is provided with the above quote about the elevators; here the ‘identity’ of some of the elevators (the parts) changed as they were put in relation to the newly defined (clarified) functions of the various floors in the building (the whole). From being ‘enablers in acute rescuing of human life’ the meaning of some of the elevators was changed to something closer to ‘everyday enablers of efficiency and comfort’ and so they needed less capacity for speed.

However, this initial rejection of the hypothesis about frequent client induced changes is in stark opposition to the interview-statements about the client and user process in general. One may then ask: why is the interviewees’ experience of many client-induced changes (or adding of scope) not reflected in the above statistics? A part of the explanation may relate to the statistics itself. As mentioned above, a list of ‘added value items’ was brought forward at the time the research was conducted, but it was not included in the statistics. As an example, the list included the CPMC request for an enclosed space around emergency generators. Another explanation for the mismatch between the statistics and the statements above may be that the TVD-chart only accounts for changes in material and on-site labour cost. This excludes changes which are associated with cost of design re-work (e.g. change of ceiling height in a room). A part of the explanation may also be that the interviews were deliberately concerned with client-induced changes and the interviewees therefore tried to accommodate the researcher’s interest by emphasizing these issues. Another explanation may be that the interviewees, being hired con-
sultants for the client, emphasized these events because they are taught to do so – they usually make money on change orders.

Similar to the process of refinement of design assumptions, the new requests from users may be understood within the hermeneutic circle of inquiry; the users constantly related their (pre-) understandings of what they considered important in particular design decisions (parts) to what was available and their evolving understanding of what was provided (the whole). As the design developed alongside with new technology, and the meaning of its parts developed accordingly, the users’ preferences – their perception of value – changed as well. Essentially the long line of changes (or refinements) may be indicative of the conversation view of design (cf. chapter 4.2). However, if this is true, then the design-changes could not have been ‘avoided’, since the users changing perceptions of value was spurred by the detailing and changes in circumstances.

Within this perceptive, the TVD-chart may then be understood as a ‘sense-making tool’ that provided an orderly perception of the fuzzy development process. Accordingly, R15 said:

\[
R15: \text{in one chart the client is informed on the state of the project. There are so many problems which is given of a project of this scale, but overall if the graph is going the way intended to go that means we are acknowledging the problems and we are working together to resolve them and moving ahead}
\]

\[
R15: \text{I also think it puts in perspective the whole process because…design is a very subjective matter. People can have ten different opinions, but when you put numbers…there is no other way around it. The graph is going up it’s going down. It can never be seen by somebody as…wait a minute that is going up. There are no contradictions…right?}
\]

\[
R15: \text{So it is a good platform for the team to come together and talk about facts.}
\]

This quote reveals a taken-for-granted assumption: that the TVD-chart was an undisputable, factual indicator of project success (value increase). This is a subject within the next perspective of reflection: critical theory.

**Interpretations inspired by critical theory**

Within the lean approach, it can be said that values/opinions are downplayed. It is not a matter of liking or disliking, but a matter of optimizing the product, ‘the hospital machine’, by providing cheaper solutions that are (quantifiable) better in various respects.
If the target is reached the machine can be upgraded with more equipment and functionalities determined by the client. Increases or decreases in value thereby become (independently) objective and the TVD-chart becomes a simple value-barometer. The chart defined the success of the project participants, who were constantly reminded by the owner that as long as it continued in the right direction, they would keep their jobs. In addition, the success was directly assigned to the lean and collaborative effort (e.g. TVD-meeting 17th of March 2009). From a critical theoretical perspective this may be interpreted as a case of distorted communication, where the owner and GC executive monopolize a specific ‘world view’.

The whole review process where every design-decision had to be justified – not through sharing of ‘opinions’ but via hard ‘facts’ – can be understood as an attempt to escape the messy subjectivity that is associated with social process view of designing (see chapter 4.2). Consequently the management approach represents the ideals of a technical-rational society. Accordingly, some researchers within the lean construction community are starting to speak of ‘evidence-based-design’ (e.g. Rybkowski & Ballard, 2008). The early involvement of trade-partners, the collaborative approach and consequently the democratization of design, which is no longer the exclusive domain of the architect, can then be understood as another ‘security net’ against the subjectivity in choosing, representing and interpreting these ‘facts’ – the more people who are involved, the greater chance of ‘catching’ subjective ‘bias’ and errors in decision-making. The notion of the IPD team can be understood as a ‘censor committee’ against individual errors and self-interest (hence the initial unease among new project participants). Based on a widely held view of common industry practice as pervaded by self-interest, deception and sub-optimization, the project participants were asked to lay aside their self-interest and become loyal to the client – according to the management philosophy this will ultimately be for their own benefit (they get a bonus and the project will not be terminated). Thus, the notions of ‘client value’ and ‘collaboration’ became means of control.

Within this engineering rationality, the initial target setting turns into a problem because it cannot be based on facts. By the same token, aesthetics becomes an issue; it does not fit into the process of engineering optimization. One way to overcome this is to perceive a certain appearance as a constraint (defined either by the architect or the city) and then provide the ‘same appearance’ as cheap as possible (as with the facade). Another way around this is to try to objectify aesthetics through theory about colour, shapes and light. Accordingly, a senior architectural planner explained:
Senior architectural planner: Certain colours make us feel certain things other colours make us feel something else. Being able to articulate that or share that with the owner [or] user is confidence inspiring, that there is theory behind it...

However, even though such ‘factual’ arguments were weighted and considered important in various design decisions, there was no escaping the overall determining factor to legitimize decisions: cost. Thus, the ‘democratization’ of decision-making was still steered by the logic of the GC and owner as well as their focus on cost-savings. The pressure to achieve cost-savings is apparent in the quotes above and the result is evident when looking at the statistics (e.g. Chart 6.3.3.1). The ‘cost-regime’ is also reflected in the rather sceptic attitude of R5 in the quote below:

**Researcher:** But as far as the cost go…um…up until now, they have been going down, at least in the estimates.
**R5:** That is what I hear - it is almost like a religious revival at the meetings.

However, the owner’s focus on cost may seem very legitimate – if target was not reached the project would be cancelled. The owner’s funding provided the basis for everything and so if the AEC professionals would like to get paid and see the result of their efforts, they needed to accept this constraint (which the designers were constantly reminded of). However, if one adopts a (very) negative, critical perspective this may seem as a reduction of designers and contractors to instrumental Commodities in a rational system of optimization, which paid no attention to the stressful experience of being subject to constant review and re-work (designer fatigue). Yet, the ‘workers’ were (mostly) enthused about the concept. To some of them, their belief almost became dogmatic: They read the ‘Toyota Way’ and adopted the lean phrases (continuous improvement, go slow to go fast, optimize the whole…) as undisputable principles of conduct, while celebrating the savings as indicative of their collective success. Those in doubt were (by some of the interviewees) considered ignorant and/or subjects of a natural resistance towards change. The followers enjoyed being on the ‘hero-list’ and part of the state-of-the-art project, which the owner and GC so heavily promoted within (and outside) the project organization. This made them strive even more for ‘perfection’. This is illustrated with the following quote by R13:

**Researcher:** But where does this...
**R13:** Drive come from? I think it’s because it’s new, it’s a new process...well new...for this team I guess, this industry or this project. The want to making this project succeed I think it’s...you know...we keep on being told by you know [the owner representative] this is the only job like this in the world, this is, you know, cutting-edge, you know?
So, within a (negative) critical theoretical perspective one may understand this as a successful case of social engineering and exploitation.

One may then ask whether this dominating perspective is plausible e.g. can for example the development in the TVD-chart be seen as anything other than a success-story? Interestingly, the target value kept going up and so the project became more and more expensive – as it did in the former attempt (although not at the same extent). However, the TVD-chart provided the comfort of understanding the budget-increase as a rational development in the process of value-maximization. Also, the idea of ‘right-sizing’ everything to a minimum was questioned by some of the architects with reference to the life-span of the building – no flexibility was incorporated and so the users might out-grow the building shortly after its commissioning.

On the other hand, the above description of a dominating, distorted world-view is to some extent contradicted by the multiplicity of perspectives among project participants, which were apparent in some of the quotes above. Accordingly, other studies have shown that attempts of management control seldom win through completely (Alvesson & Deetz, 2000). The critical statements provided by the interviewees are in themselves an expression of ‘freedom of speech’. Instead of seeing the project participants as dominated by management, the participants may have understood the ‘facade’ of the system, which they needed to uphold, but at the same time they infused their own perceptions of value and interests in every decision – guised in what appeared to be objective, client focused decision-documents and estimates. It became an arena of representing randomly made, notoriously subjective decisions as rational and consistent, with (overall) cost-savings as the only inescapable criteria. This interpretation connects somewhat to the process view of designing (see chapter 4.2).

Lastly, within this perspective, some considerations should be made regarding the normative structures that may have effected (distorted) the researcher in his analysis. Accordingly, the rather negative perspective on the enthusiasm and self-celebrations, which were apparent in the TVD-meetings, as being indicative of an almost religious atmosphere, may stem from a cultural difference between the United States and Denmark. The Danish culture appreciates humility and a down-to-earth attitude and is sceptical towards pride and self-complacency – even though it may be legitimate. To the researcher it was apparent that Americans, in general, were more used to acknowledging and celebrating their successes (e.g. American bumper stickers about being a proud parent of a child doing this and that – this is never seen in Denmark). In addition, an academic ideal of being critical towards ‘management’ may have affected the researcher to adopt an overly negative stance. Consequently, one may ask whether this is a disre-
spectful attempt to dissociate oneself from practical management, where a well-intended effort was made to really convince people to work in a new and better way (which may necessitate a dogmatic stubbornness). Finally, critical theory aims to counteract the reproduction of dominant ideas and power-structures and yet the researcher’s interest in and description of lean reproduces the notion of management as something powerful. Also, the depiction of management as influential, but difficult and potentially deceiving, is in the interest of the company that funds the research. Accordingly, the question about management effects and problems stem in itself from a company desire to develop and sell a better management concept – therefore existing management concepts need to be criticized.

Interpretations inspired by postmodernism

The postmodern view could similarly have provided reflections on the structures/discourses that may have influenced the researcher. However, to avoid self-centredness, this is not dealt with any further. Instead, some perspective is provided to the content of the above interpretations (of the case-study) and new interpretations are offered.

First of all, the whole idea of making a linkage between changes and particular reason-categories is illusive, because of the subjective construction of categories (by both interviewee and researcher). Within this view, it seems most compelling to accept that a number of different, more or less random things have to happen for any ‘changes’ to occur – there is no pattern of reasons. This is indicated by R7 in the quote below:

R7: I don’t remember exactly what happened, but again a number of things happened, structural…and (it’s) again one of those design disciplines that are tied up to a number of different things. I mean architectural effects structural, MEP effects structural, exterior effects structural. It can go either way. And there are so many pieces… I don’t know if you have seen my interdependencies sheet… have you seen that? [...] So there are so many interdependencies between structural and maybe that week we… you know, found something that we didn’t have in place and that caused some update.

Secondly, subjectivity in decision-making (documents) is not associated with occasional, intentional manipulation, but unavoidable because of the power of multiple discourses, which influence the actors in their choosing and representation of ‘facts’. In addition, the document, within this view, is set ‘free’ from its originator and becomes subject of fleeting interpretations.
Consequently, the subjectivity in decision making is only natural and so is the observed tension. All actors have different historical backgrounds and rationalities associated with their professional identities (architects, contractors etc) and if one assumes that they also have a ‘will to power’, tension is unavoidable. The likelihood of tension is somewhat reinforced by the management approach: Instead of the ‘traditional’ linier approach, where design is mostly based on the exclusive rationality of the architect (and which in the current discourse is perceived as unsuccessful), lean construction, as an ‘innovative’ anti-paradigm, aims to stimulate (mild) confrontation between multiple perspectives in a constant dialog/negotiation through recurring planning and review sessions.

Within this view, collaboration can be understood as a project storyline that is instrumental in disciplining the tension. Thus, if the tension becomes too aggressive the aggressor will be labelled as non-collaborative and risk exclusion from the group. Thus, the notion of collaboration can – as in critical theory – be seen as a counter-concept to traditional industry practice, which is understood as non-collaborative, but it is not a manipulating strategy conceived by management (there is no conscious dominant group), but a simple consequence of the current discourse. Accordingly, values-based management, which also entail emphasis on shared values and collaboration, builds on the notion of a post-traditional society (see chapter 5.4 and particularly Beyer 2006).

In addition, a particular aspect of postmodernism, which may be beneficial to employ in the context of ‘management of value’, is attention to the constitution of identity. Interestingly enough, the categories; architect, engineer and contractor etc. were still very apparent in the way people spoke of each other and themselves within the (so called) integrated team. However, within the lean approach, with its democratization of design, the traditional notion of the architect as a ‘leader of design’ seemed to be challenged. As apparent in (and reinforced by) the organizational chart, the architectural group of designers and planners were to some extent separated from the IPD team and through their exclusive knowledge of aesthetics and their function as planners, engaged in the user-process, they (as a group) were instead ‘asked’ to become the ‘protectors of aesthetics and vision’ (e.g. see quotes in the sub-chapter: Different perspectives and perceptions of value). However, the vision was not coherent but constantly influenced by the client, the users and the surrounding society. In this way, the architects became (stayed) disconnected from the process of optimization as neither of these two aspects, aesthetics and vision, really coincided with the predominant (optimization) logic. However, individually, different identities were invoked. As briefly mentioned in chapter 4.2, the notion of “architects” covers a wide range of people who adopt different rationalities (Beim & Jensen, 2005). In this project, the identities seemed to range between the pragmatic architectural consultant, who tried to adopt the ‘optimization’ rationality (evidence based
design), to the almost supercilious and passionate idealist clinging on to a more traditional self-image of an ‘artist’ (cf. interview-quotes above). However, to avoid putting the interviewees (further) into categories, none are highlighted here. Within this line of thought, it is also uncertain whether these identities were simply invoked by the specific interview context or setting in which they were ‘observed’. The conventional categorization of architects, contractors etc. may also be misleading. While some interviewees spoke of the contractor-side and the architect-side, one of the interviewees (R13) suggested that a difference in attitude, towards the management concept, was associated with a difference in age:

R13: We have had a hard time just getting people to just buy into this new process. You know if someone has done it 30 years one way, they’re not…it’s like they don’t want to learn a new way or they, you know, can’t see the value in it or…I mean there is a million different reasons for people don’t buy into it. So that has been the hardest one to get everybody to sort of like agree that this is a good thing, right? They think of it as a…oh…it’s just a new term for something we did 10 years ago or 20 years ago…just a new spin, so I think I find that the majority of younger people, maybe 35 and younger are open to it, maybe even 40 and younger...

However, this may also be viewed as a confirmation of the above interpretation, where the historical background of the actors is emphasized; the discursive identity of e.g. the architect is in constant flux and some may cling on to earlier versions, while others are only starting to assimilate. If one differs from the postmodernist perspective for a moment, it may be added that some people are just more ‘stable’ than others (Alvesson & Sköldberg, 2000:166)

One may also question: who or what takes care of ‘optimizing the whole’? It is presumed that the exposure of solutions to other specialists and their evaluation in a democratic paradigm automatically qualifies the best solutions – but maybe it will just result in a messy negotiated compromise that is heavily influenced by power. Thus without a clear leader of design, other than the client, consistency or, within this context; a unifying narrative may be lost.\(^{34}\)

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\(^{34}\) Value manager (when reviewing draft analysis): “There are some things you are not aware of. It is possible to do more work on optimizing the whole and include some techniques. We had some political issues because this was the first time this team had worked together. If we had a second hospital, I believe we could build upon what we have learned and improve further.”
Like critical theory, postmodernism is concerned with the subjectivity in representation and exclusion. Regarding the latter, one may ask: why were the user and client representatives not interviewed? Their voices should be heard as well. The reason for this is however very simple: they were less available. The client representatives were busy, high-level people and the doctors and nurses did not even have the time to participate in the user-groups. Regarding representation, it would be fairly easy to depict the case-study project as a state-of-the-art management experiment, which should be the role-model for future construction projects. On the contrary, within a critical theoretical perspective, one could represent it as a manipulating, exploiting, cost-cutting regime. However, none of these storylines seem very useful except for the tension and perspective they may provide, when looked at concurrently. Regarding the former, it would be a boring conclusion, which would only serve as a confirmation (or promotion) of something that other researchers have already developed. Regarding the latter, it is important to remember that most of the project participants were enthused about working on this project, which seems to be a valuable effect in itself. If they, the AEC-professionals or the client, in fact were being exploited, they liked it (at least most of them). A third interpretation was provided through the lens of postmodernism. Here the subjectivity in decision-making as well as the observed tension is seen as an effect of colliding, ever-changing discourses. In addition the management approach is interpreted as a counter-image of what is perceived to be traditional practice. Collectively the different interpretations highlight different aspects in the case-study. In the following, a summary will be provided.

6.3.6 Summary
The case-study sub-research question 1 aimed at exploring the reasons for cost and design changes. The statistics show that changes happen for a lot of reasons. However, it seems that most changes (in this project) can be understood as part of a ‘design evolution’ process where assumptions are gradually refined and adjusted for interdependencies between design disciplines. Regarding the hypothesis about (many) client-induced changes, the statistics showed a few, but important changes, with far-reaching consequences. In addition, it seems that ‘multiple voices’ in the client group caused a lot of frustration among the designers. The conclusion is therefore ambiguous: On the one hand, it seems that the majority of changes happen as a natural part of the design process – not because of the client. On the other hand, the (few?) changes coming from the client can have a major impact. In addition, there can be a lot of frustration associated with the client and user process, which may not cause many design-changes, but entail a lot of clarification before design can take place. The interviewees were uncertain about how to handle this and the lean concept had not provided them with any answers (yet). If the changing requirements (perceptions of what is valuable) from the users were an
effect of an evolving understanding of the design (because of detailing) and changes in circumstances (change in technology) they could not – in the context of value management – have been avoided by an initial statement about values or preferred qualities.

In this project, the owner’s focus on getting to target seems to have had a real impact; many design-decisions have been made (and probably thought of) because they provided cost-savings. It also seems evident that the lean principles and specifically the TVD-process have been instrumental in accomplishing this, by constantly reminding the designers of the cost-impact of their endeavours as well as providing the time to explore alternatives and make adjustments when needed. In addition, it is without a doubt that a project storyline had been created, where most of the participants perceived themselves as part of a successful state-of-the-art management experiment. The collaborative atmosphere, which the participants spoke of, seemed itself to be a valuable accomplishment. However, the uncertainty associated with (initial) design and estimating, combined with a pressure to demonstrate cost savings and a demand for openness, was a challenge for some of the firms involved. In addition, the length of the pre-construction phase and the piecemeal (line-item) approach of adding more scope, when the costs had reached a certain level, seemed to disregard a holistic, integrated view on design, the different stages in design progression as well as the potential frustration associated with design re-work. However, there appears to be a benefit associated with the transparency (sensemaking) it provides: According to some of the interviews, the ‘wish-list’ is traditionally added in an unstructured manner, which can be very frustrating. With the line-item approach a clear picture was provided as to ‘what is going on here’. However, concerns were also expressed regarding the ‘accuracy’ and the relevance of the initial target value, which was to be understood as a constraint, when everything else evolved. Subsequently, this actually lead to a re-setting of the targets for each cluster-group, but the overall target remained.

Client value is the centre of attention in lean and maybe appropriately so. The case-study shows how the different participants held strong and sometimes opposing opinions about design. There seemed to be a negotiation taking place between different rationalities and perceptions of value. An important lesson (reminder) may be that the optimization logic of (value) engineering only applies for engineering problems. Also, a standardized process of evaluation, with A3 reports and CBA, cannot escape subjectivity in decisions-making – it does however help to show the (subjective) grounds for decisions. This again provides clarity (sensemaking), which can be perceived to be

35 Value manager (when reviewing draft analysis): “I don’t agree. Most of the team did not know how to do effective value engineering because they were not trained. Their experiences with it are limited. Consequently their opinions are often negative.”
valuable in itself. The standardized decision-making process also enabled the participants to act (except when it was breached by client politics). On the other hand, one may question whether client value is a naïve ideal, because of the (designer) subjectivity associated with creating and representing design (at least when looked at from a post-modern perspective). This probably depends on the experience of the client representatives. In addition, the review process may be a means to test and repress individual subjectivity. However a possible down-side is that it can be perceived as disrespectful towards the individual designer’s creation and (again) lead to designer fatigue. Specifically, the ‘democratization’ of design can be seen as an attack on the traditional leading role of the architect – this may lead to resistance.

Through a hermeneutic lens, and with reference to design theory, the design process was described as an ongoing conversation between part and whole. As the users and designers clarified and ascribed meaning to the whole, the meaning of the parts changed and vice versa. In this process the TVD-chart can be understood as a sense-making tool that functions as a barometer of success. Although the budget kept increasing each time ‘added-value items’ were injected into the project (as it did in the two former project-attempts), the participants found comfort in the TVD-chart as indicator of a rational process of value-maximization. Also, as with the decision-making process, the TVD-representation enabled the participants to act (e.g. add ‘value’ and/or continue to fund the project). It provided ‘process value’ through sense-making. To the researcher, this somewhat ironic interpretation seems to hold some validity. It (partly) came out of critical-theory, which also provided the ‘machine’ metaphor and pointed at the risk of manipulating and exploiting the designers (as well as the client). The strong promotion of lean and focus on cost-reductions may be understood as a case of distorted communication, where the owner and GC executives monopolized a specific world view. Although this appears to be an exaggerated interpretation, there seemed to be a real risk of dogmatism, where for example the long-term vision (value) might have suffered under a ‘right-sizing’ paradigm. The postmodern perspective emphasized the multiplicity in reasons for changes and further spurred the discussion about subjectivity in design, where multiple discourses work through the actors in an ongoing negotiation. The storyline about collaboration can, within this view, be seen as instrumental in disciplining the negotiation/tension. Furthermore, the postmodern lens helped to elaborate on the challenged identity of the architect, which may have changed from ‘leader of design’ to something like ‘protector of aesthetics and vision’. However, the appropriateness of this categorization was also questioned. Finally, it was suggested that the democratization of design may result in the loss of a unifying design narrative. The interpretations and more specific answers to the research questions are summarized in table 6.3.5.1 below.
Research questions | Hermeneutics | Critical theory | Postmodernism
--- | --- | --- | ---
**What are the reasons that underlie the changes mapped in the TVD-chart?** | ‘Design evolution’ via oscillation between part and whole in the ongoing review process | An effect of the technical-rational review regime | Various, random reasons
- Only a few client induced changes

**How do the client and other project stakeholders’ perceptions of value manifest? (RQ 1)** | Somewhat through design changes (e.g. cost focus) | Through selective presentation of advantages/solutions | Via clashes between discourses (roles)
- In the setting of priorities in design discussions

**What are the effects, of the application of the TVD/Lean approach? (RQ 2)** | Cost focus | Repression of subjectivity (?) | A change of role frames
- Work-spirit | Manipulation and exploitation of consultants | Collaboration as a useful storyline to discipline tension
- Sensemaking | Distortion of communication | Loss of consistency (unifying design narrative)

**What issues can be identified (and imagined) in relation to management of client value creation? (RQ 2)** | The unending piece-meal approach conflicts with:
- Architectural design rationality
- The different stages of design development
- Designer fatigue
- Estrangement towards an arbitrary fixed target | Distortion of communication | Loss of consistency (unifying design narrative)

Table 6.3.5.1: Summary of case-study answers to research questions

A year after the lean consultant provided the following update:

- Estimated cost is now more than $13 million below allowable [target cost]
- That $13 million has been used to fund the highest priority value-add items
- A new initiative was launched two weeks ago: TVD for production. It has an initial target to save $22 million, which is needed to offset the cost overrun for preconstruction. Once that is achieved, a more ambitious target will be set, and the savings used to fund additional value-adds to the tune of approximately $57 million. The expectation is that product design refinement has about run out of steam, so additional cost savings must come from production (construction). The troops are very excited about this. I spoke informally with the Rosendin construction team last week. They explained how they have been going to other Rosendin projects to do current state mapping of construction operations, then to test future states. They say this is rippling through their entire company.
- Opposite the previous experience in U.S. healthcare, lean has moved from capital projects into healthcare delivery at CPMC, the Sutter Health affiliate that owns Cathedral Hill Hospital. This may cause some headache as users
request changes in product design to facilitate changes in process, but the project can hardly complain!

The 22 million pre-construction overrun should be compared to the savings which according to the TVD chart had developed from about 60 million above target to 13 million below target (a net-saving of (60+13)-22 = $51 millions). However, it is difficult to assess these data as there is no way of knowing what the return on investment had been if the project had finished two years earlier without so many refinements.
6.4 Case study 4: Low Energy University Guest Houses

6.4.1 Case description

The fourth case-study project comprised a single university guest-house, with three apartments (about 350m² in total), located on a university campus in Denmark. Although the project was small it was no simple task. Thus, the building was to demonstrate the newest developments within low-energy/sustainable technology. Accordingly, sustainability was an explicit design parameter (quality to consider) from the beginning of the project. The owner-sponsor was an independent foundation associated with the university (a university representative acted as ‘client’). The project was funded by the foundation and a large building component supplier (alias CS-group). The CS-group primarily provides windows and intelligent control systems and wanted to test and promote ‘sustainable’ solutions in the guest house. The programming commenced in 2008 and the project was scheduled to finish in 2010. The project was undertaken in what was described as an “Integrated energy and design process”, which encompassed early involvement of all relevant parties including contractors and suppliers.

Four meetings were observed and video-recorded in the conceptual design phase. In addition to the client- and CS-group representatives, the following parties attended the meetings: an architectural firm (alias A1), which provided the project team leader who chaired the meetings, a designing architectural firm (alias A2), an engineering consultancy company, the main contractors, a research assistant conducting video recordings and a researcher from the university who focused on sustainability.
Accordingly, the research reported in this case-study was not the only research conducted in relation to the project. The other researcher was to monitor the buildings energy-performance after commissioning. Therefore, he actively took part in the meetings to make sure that the necessary monitoring devices were incorporated e.g. to monitor indoor temperature, humidity, CO₂ etc. This was something the university provided additional funding for. In that sense, the other researcher can be understood as a representative of the client.

Unfortunately the project was cancelled. The design was developed to the level of ‘design development’ (project proposal stage in a Danish context) and was at this point handed over to the client, who decided that there was not enough funding to continue. Nevertheless, the data already obtained was considered to be of value to the current study.

**Case-study relevance**

This case-study is relevant because it provided the opportunity to observe design-meetings at the early conceptual stage of the construction project, which is the main focus of the research project. In addition, because the university was client, this project furthermore offered the rare opportunity to conduct video-recording of design meetings in their natural setting. Thus this case-study was an occasion to have a look at the micro-level of group interaction in design meetings.

### 6.4.2 Data collection and case-study research questions

The case-study is based on observations of four design meetings that were video recorded, which amounted to a total of 6 hours of recording-time. All verbal communication as well as any considerable/obvious use of body language (pointing, emphasizing importance by gesticulation, looking at someone specifically, big smiles etc) was subsequently transcribed and translated into English (from Danish). This resulted in 102 pages of rich data. Permission to conduct the video recording had been obtained prior to the meetings and all participants were aware of the recording. The author was abroad (busy with the third case-study), when the meetings took place, and therefore a research assistant performed the video-recordings. The research assistant did not interfere with the meetings, but the very presence of the researcher as well as the video-recording is likely to have influenced the participants. However, considering what was said in the meetings, which was sometimes rather tactical in relation to other stakeholders, it seemed that they quickly forgot about the camera.

To get a detailed sense of the conversations, which took place, the data is presented as a chronological narrative (Maaløe, 2002) that includes many quotes to substantiate the
narrative. The quotes have primarily been selected according to the protocol described in the methodology chapter (chapter 2.3.1). A few interpretations are made concurrently with the description, which provides some initial cues for the subsequent analysis. The fourth meeting has, however, been excluded as it was mostly a very technical meeting about LED-lighting. The analysis will be performed via the three analytical perspectives and is guided by the two first research questions:

1. How do the client and other project stakeholders’ perceptions of value manifest in conceptual construction project design-processes?

2. What issues can be identified in conceptual construction project design-processes in relation to management of client value creation?

6.4.3 Data

Meeting 1: Design meeting 2nd of April 2009

The meeting took place at the head office of CS-group. The CS-group included (includes) various subsidiaries, which had different representatives/experts present at the meeting. Also attending the meeting was the project team leader from company A1, the client representative from the university, a secretary, the main contractor, two design architects (company A2), two mechanical engineers and a low-energy building researcher from the university (see picture below).

Picture 6.4.3.1: Design meeting 1
Ventilation
The first topic of the meeting was space requirements for routing – specifically in relation to ventilation ducts. In connection to this, a problem was identified with regard to extraction of air on the upper floor of the two floor apartments; in these apartments extraction was only possible from the kitchen exhaust hood and bathroom ventilation both (at this point in time) located on the lower level (so the air needed to go “down”, even though it tends to go up). However, the senior design engineer for mechanical installations (who attended the meeting 10 minutes delayed together with his colleague No. 6) quickly shifted focus to another issue about the exhaust hoods; should they be a separate system or connected to the overall mechanical ventilation system? The engineer (No. 12) argued that it was better to separate the exhaust hoods from the ventilation system because of maintenance considerations and because the ventilation system would otherwise need excess capacity to handle the “kicks” which the exhaust hoods occasionally caused. However, No 5 (chief representative, CS-group) argued that maybe they should consider deleting the mechanical ventilation all together and rely more on natural ventilation:

[20.03] No. 5: “I am thinking whether it is possible to make calculations on these things…to calculate two scenarios: one with hybrid ventilation (which we are speaking of now) and a scenario where we don’t have mechanical ventilation (with heat recovery) at all. Where we try to provide documentation that we can do without because we have this solar heating…Is that still an open possibility to calculate these two scenarios? I can see some advantages in relation to not using mechanical ventilation. One is that – as we have just discussed – it raises the floor height and we also do a suspended ceiling in three rooms to make room for the ducts. These things could be saved if we can provide documentation that there is no need for mechanical ventilation with heat recovery.

[20.57] No. 12: Well it may show that this is true, but there are other things to consider such as draught discomfort if windows need to be open in the winter time…

So, coming from a discussion about how to accommodate space requirements for ventilation ductwork in floors and ceilings, it now become a question of whether or not mechanical ventilation should be used at all. By stating this question, No. 5 to some extent questioned the expertise/experience of the design engineer. No. 12 (the engineer) argued against this with an argument about comfort – open windows may cause draught in the wintertime. At this point No. 10 (expert, CS-group) drew attention to their window products:
[23.30] No. 10: “If you use [CS-group] windows for natural ventilation you have a valve that you can open, so you have air change, with pretty low velocity, and you can put in a barrier that makes sure that you don’t get a larger air change than you need (it creates an upper limit) […] So natural ventilation by means of windows is often a good solution and it is only seldom that it will be necessary to open the windows a lot”.

Then No. 13 used a remote control to operate an electrical motor, which opened and closed a window in the ceiling of the meeting room. This created a lot of noise and the discussion was interrupted. No. 14 then introduced no. 13 who was a specialist in window control systems and no. 10 who was a specialist on thermal indoor climate and ventilation – both representing companies in the CS-group. No. 14 (also representing the CS-group) continued:

[25:22] No. 14: You have been put in the middle of a very intense discussion about some buildings that you don’t know much about. But we think it is a good idea to bring it into this room and this house because then we can talk about daylight and how natural ventilation works, so if it is okay with the agenda, we would like to have a small contribution...

And so it seemed that natural ventilation had been on the ‘agenda’ from the very beginning (at least from the supplier’s point of view). Then No. 11 was introduced, who represented a smaller company in the CS-group and likewise had expertise in control systems. However, No. 12 tried to re-establish focus:

[26:12] No. 12 “Yes well, it is a possibility [to avoid using mechanical ventilation], we can just…it is just regarding comfort…if the calculation works out [in relation to the requirements for low energy housing]…then it is probably the consequences with regard to ‘comfort’ that should be considered...
[26:36] No. 8: “How can we then communicate these consequences with regard to comfort…”
No. 12: Then we would probably need to make a “CDF” [he probably means CFD: Computational fluid dynamics] calculation, something like that, some kind of “air escape” calculation...
No. 5: “Yes, well [noise]…”…points at no. 11…[indicating that he might be able to do this]
No. 11: “Um, well, we usually…”[he can’t]
No. 7: Or we can wait until winter season and then you can also move in here [laughter…]
So, the engineer continued his argument and again he was met with a request for documentation/hard facts. Then No. 7 (design architect) to some extent released the tension via her suggestion to move into the building, which the supplier so strongly promoted. In continuation of this No. 5 argued that he could now feel the effect of the window that had just been opened. Then they discussed the operability of windows and whether users would actually open the windows when it was ‘needed’. After a while the engineer stated:

[30.38] No. 12: “I just want to say that I am completely convinced that from an energy perspective then the best solution is the one that is already described with three principles: mechanical ventilation – a hybrid of this, and then natural ventilation. At least from an energy perspective… I don’t think… then you can use each of the systems whenever it fits… in relation to energy consumption…

[31.11] No. 11: Well that then also need automatic control… because… [?? Noise]…

[31.27] No. 7: But initially we asked about experiences with extraction through exhaust hoods… that it works as a whole system… where from do we get those references? [giggles]

[31.39] No. 12… well you can come by…

[31.40] No. 5: Well according to the agenda we are supposed to talk about ventilation strategy a little bit later…

[Laughter]

[32.00] No. 8 I think that we have now seen the plans and I think we should continue on talking about daylight…

Now the engineer argued from an energy consumption perspective whereas it was from a comfort perspective earlier on. No. 7 returned to the argument about documentation in relation to exhaust hoods, which again can be interpreted as scepticism towards the engineers “conviction”. It also showed how the discussion to some extent was going in circles. No. 5 interrupted the conversation by changing focus completely by reference to the agenda. So far this left the ventilation discussion without any conclusions.

**Daylight**

No. 14 then told a story about the building they were sitting in; it was a CO₂ / energy neutral house build in 2005 with various intelligent features and a high daylight factor compared to similar low-energy houses. No. 13 demonstrated how the awnings could be controlled via the remote control.
Then No. 7 started a presentation regarding the design of the guesthouses that were to be built. She placed a small scale guesthouse model on the table and outlined the overall architectural concept and the underpinning assumptions for the daylight analysis (via MS PowerPoint slides). The model had been included in a big presentation a couple of weeks prior to this meeting and concerns had been raised in relation to the level of daylight at the ground floor of the building, where the rooms were relatively “deep”. She had worked on this issue since then (via a computer model), but emphasized that she did not have the answer yet and so the participants would not get any façade drawings today.

No. 7 then presented the overall façade expression and said specifically that she had assumed the use of the CS-group window products. She made some comments on the standard sizes and also that she had investigated some other products available (from the CS-group). She seemed a little nervous; she giggled a lot, said “um” and asked if she was using the right technical terms etc. She was clearly not familiar with the computer programme used for the analysis and No. 14 (CS-group) provided explanation for some of its output as well as tips and tricks regarding software functionalities. They discussed the furniture layout of the rooms in relation to functionality and daylight requirements:

[46.50] No. 5: Could we not already state that one or two of these smaller rooms will be offices where people work and treat them as workstations?

[46.58] No. 7: “Yes”

[...]  

[47.14] No. 7: “And then you can of course ask yourself: would they prefer darkness because they are working on their laptops...(giggles)...but at least there is the possibility of going to a very illuminated place and work...and I don’t know...this is something that you must answer...how do we approach this?...But offhand I would say...”

This illustrated uncertainty regarding user requirements and an initial attempt to make a decision regarding the functionality of the rooms. However, there were more things to consider regarding contrasts, the reveals and window panes effect on the distribution of lighting etc. The CS-group representative (No. 14) provided a lot of input on these things and ended up suggesting that No. 7 should go home and have a look at it. The architect replied that it would be nice if they could do this together. The architect was clearly asking for the manufactures help in resolving these more specific lighting issues.

The architect then expressed a concern about whether it would get too hot in the summer time with all the lighting. The manufacture suggested controlling this via awning
equipment (which they also produced) in stead of reducing the size of windows. The architect replied:

[50.19] No. 7: “Yes, well I think that it is very nice with intelligent products, but as the point of departure I also think that we should get the most intelligent design…um…so I hope that we can have another session where we can adjust these things…um…but shouldn’t we carry on and look at some real pictures…(?) (giggles)

Soon after No. 5 stated:

[51.25] No. 5: “I have a comment to this picture…it is actually a really good picture…which actually shows how we should work with ventilation…because it can become a problem if we use natural ventilation in the window that is just in front of the desk because then there will be a draught where you are sitting working, but then you have a window in a little distance, and this was the window that you could use as the window which creates the natural ventilation. Then you avoid draught in the workplace…so in this way, this picture is actually a really good picture. If you could work in same way in the other rooms, by having windows which provides a lot of daylight and also have smaller windows which provide secondary daylight but also work as the ones which create natural ventilation, where we avoid draught?

[52.10] No. 7: “But we do not want another parameter (giggles) because we need to position these windows…and [?? Noise]…”

Here No. 5 had found an argument for resolving the ‘comfort’ issue in relation to natural ventilation and brought up the topic again even though it was him who changed the subject earlier on (with reference to the agenda). The architect expressed some frustration about having yet another design parameter to consider (ventilation/draught in relation to window arrangement). No. 6 returned to the issue about furniture layout:

[52.19] No. 6: “But you should also be careful with the interior arrangement, be careful that the arrangement does not get completely fixed and things can only be arranged in this particular way because it is a house where people should be allowed to have some freedom […]

[52.30] No. 7: (interrupts) “Well it is guesthouses so I would guess…you never know what they will be used for later on…but I would guess that it will be fixed. I myself think that it is fantastic that in all bedrooms the desks and beds can be moved around, so if you want to have 500 lux, you can have it, but if
you want to move it around the corner and sit with your PC, you can do that to...

[52.55] No. 5: “But both of these windows have motors – it is a sloping façade – so both windows have motors, so if you move things around, you may also in your programming change what window will create the natural ventilation, so you avoid the draught.”

[53.11] No. 7: “There are some possibilities in that…” [Goes to her laptop and continues her presentation]

Apparently they were trying to ‘configure’ design topics that were all interdependent: furniture layout (functionality), daylight, ventilation and future flexibility. Or it may seem that no. 6 (design engineer) and no. 5 (CS-group chief representative) were indirectly continuing their argument about ventilation principle. However, nothing was settled and No. 7 broke off the discussion by continuing her presentation. They discussed the daylight factor analysis and how to interpret the results. At the end of the presentation No. 8 (the project team leader) stated:

[4.18] No. 8: “Yes about the process for decision-making about sizes of daylight and windows…then I think that it will have to be about the end of April…we will start making conclusions regarding the sizes in the façade and decide…because then the concluding verification of whether the budget holds will…Well, [No. 2 – the contractor representative] is monitoring it and he also is comfortable as it is now [laughter – participants look at No. 2]…but then we can…

[4.53] No. 7: “Well the way I see it…

[4.54] No. 2: “Well, it is hard to figure out the cost, when you don’t know the sizes of the areas…”

This is the first time considerations about a decision making process was made explicit. The contractor was very direct and asked for more solid design specification as a basis for estimating. Thus, the pressure was on the architect, who then invited the CS-group to collaborate on resolving the design issues:

[5.01] No. 7: “Well, I would say that it is not that we are not close, but there are some things which are causing problems…and these things I would prefer to go over together with you guys…

[5.21]: No. 14 [nods]: “Do you have a 3D model of the house?”

No. 7: No, I have this one [points at the physical model on the table and smiles]
No. 7 was not capable of providing a 3D model, but the CS-group offered to help her. Shortly after No. 7 then made the following comment:

[6.33] No. 7: Yes, but I think that the various things have been considered at this point...[No. 14 nods] and I have – you see – all the time been sitting with one hand [working on] a sketch to assess what it actually looks like...when you work with façades there are two worlds, right?...and what I think lacks at this point is some completely...well the [a CS-group window type] sizes we know now, but the [some other window type] sizes we still need to get sorted out..

Accordingly No. 7 stated that the designers had considered all these issues, but it was complicated because they also needed to take into consideration the aesthetic design parameter (the architects’ exclusive domain) and indicated that she had difficulty in aligning this with the component supplier’s standard window sizes. They settled this by agreeing on a meeting between some CS-group experts and the design architects. No. 5 then went back to the question about natural ventilation:

[8.05] No. 5: And then I have two comments, one is: Now when you place the windows, then consider that there should be natural ventilation...
(No. 7: giggles)...No. 5:...one of the windows need to be used for...as you have pointed out...the primary is natural ventilation windows...

The way No. 5 stated this, signalled that “this is how it is going to be” and, in light of the earlier discussion with the design engineer, this was probably why No. 7 giggled. No. 5 then provided some other suggestions about sky-lights and the configuration of windows and No. 7 said “thanks for the comments”. They then moved on to a new topic, which was the control system. Thus, the outcome of the daylight analysis presentation had been sharing of information and identification of some issues that were to be resolved in other meetings.

Control system
The expert (No. 13) from the component supplier explained their product, which integrated the control of various intelligent systems and made it possible to operate them from a single remote control. However, not all products, such as the ventilation system, were compatible with the “software language” of the control system. No. 12 made the following enquiry:

[16.33]No. 12: “Then what...when we connect this ventilation system to [the control system] ...can we control it, can we stop it, can we control injection
temperature …all the alarms, can we decide ourselves what kind of data we would like? Or is it limited? [looks at No. 13].

…

No. 11: Well it also depends on…[the company that provides ventilation]…what kind of feed-back they provide…[uses some technical terms…no. 12 nods]…the data they provide, we can absorb. If they can provide injection and exhaust temperature, then we can record it.

No. 12: Okay…

The attending researcher also had wishes:

[18.42] No. 9: [the university] may have some additional wishes in relation to temperature sensors – I would imagine…I still haven’t got feed-back from one of the (research) projects, but I would imagine that he would like to have more measurements…

[18.59] No. 6: But this is something additional, this is not something that we should steer by…

No. 9: No, no that is not something that you should steer by…

Thus, this design discipline was for the moment rejected in order to reduce complexity. However, now the client expressed a concern about the ‘compatibility issue’:

[19.07]: No. 3 “How do we move on with this…? Really, this project should not pay for a development of the communication between these programmes.

[19.14]: No. 11: (interrupts) No, we have…well, if we use our advance system, which is our big system, and I could not imagine that you are not using this at the moment…this is developed.

No. 3: Well, I am thinking of the communication with the ventilation system where…

No. 11: We already do that…

No. 3: You do..?

No. 11: Yes...if it is companies that we are used to...well if they have a [some technical term] access, which most companies have...of some sort...an interface so that we can talk to it...then we just...

[19.43] No. 3: That is what I mean...how do we progress with that, so we are sure that they can in fact communicate...?

The control system expert referred to a reference where they had integrated everything – they had done it before. No. 5 then suggested that the project team members should have a field trip to see this reference. However, No. 5 then drew attention to the solar
heating system, which was not compatible either. The engineers agreed with No. 5 that this was not a problem as such – it could run as a separate system – but the researcher was concerned that he might not be able to log any data from the solar heating system. The CS-group would check up on its solar heating vendor (who apparently has been asked this question before). The project team leader (No. 8) asked No. 13 if he had any more to add, which he did not, and they moved on to the next topic. Hence, information had been given and some issues had been raised, but none had been resolved.

Ventilation (II)
Another CS-group representative (No. 15) joined the meeting to inform the project team about a potential ventilation system supplier for the project. The supplier was part of the CS-group, but from another European country, and had developed products specifically for low-energy housing. No. 8 wanted to know about any Danish references, whereas No. 7 asked:

No. 7: Now we have just spoken about natural ventilation [giggles and looks at No. 5]. Where does [this company] fit into this project...?

No. 15 stated that the company would be relevant in relation to mechanical ventilation. The conversation continued:

[28.55]: No. 7: So...(?)...[looks at No. 5 and giggles]...
No. 8: I would also like to know what is the approach...? How do you see them in this project? It’s just that I can’t picture it...
[29.21]: No. 12: Well, we do need some kind of system and this system is very much alike the system we looked at initially from [some Danish vendor]...um...which had the specifications that fitted with this project’s requirements...and then it is a [“CS-group”] product...so why not use this...if they have a product which fits our system...so that was the primary reason for this...

No. 7 clearly saw a contradiction here in relation to the statements that No. 5 had made earlier on with regard to natural ventilation (see looked towards him), whereas No. 12 stated: “we do need some kind of [mechanical ventilation] system”. The engineer backed up his argument with the fact that it was a CS-group product. Thus, the discussion about the fundamental ventilation principle continued.

They carried on talking about some technical requirement (ability to stop the fans individually, when the system is working as ‘hybrid ventilation’ together with natural ventilation), which the engineers would like the supplier to provide, and No. 8 then sug-
gested that a ‘ventilation meeting’ should be held, where the engineers, the supplier representative and the mechanical contractor could discuss these technical details and also consider the associated cost (before any decision was made about using this supplier). No. 12 stated that these technical requests should not be a problem – the supplier “ought to be able to do it”. The participants laughed and No. 5 pointed out that if it was not a standard solution it would be more expensive. Accordingly, the design-engineer’s concept of a hybrid ventilation system was subject to more pressure. However, No. 5 stated that it was probably not that difficult.

No. 15 continued to answer some technical questions, which had been asked prior to the meeting and also suggested some ‘innovative’ solutions that the supplier had developed, which he thought might be relevant to the project. No. 5 then asked a question regarding monitoring in relation to the research project(s) and they discussed how data could be retrieved from the ventilation system. No. 15 then stated that the ventilation system, that the supplier produced, was a ‘closed system’ that could not be controlled via the integrating control-system that No. 13 promoted earlier on. No. 5 suggested resolving this problem internally in the CS-group because it was probably something that future clients would ask for as well. The client representative (No. 3) then made a reference back to his earlier argument:

[49.24] No. 3: ”That was what I was talking about earlier on, because I have tried this before and if everybody isn’t up to it then ‘the chain will break at some point’ and it will become very, very expensive…and these development costs are not going to be…I definitely think that this project should not pay for these…that is something the individual participants must do right?…um…and are there other subjects in relation to…which need to be able to communicate with each other…is everything on the table? It is presumably you who should know this [points at No. 11]…if it is your system that is to control everything.

[49.52] No. 11: Yes, yes, well I need to know what I must control…you could argue…that is…now I don’t know all the details about the house…but…there is probably not much more than in [mentions a reference] except for some additional monitoring…as I said we control everything in [the reference] and [another reference], which is a larger project we also control everything, so that is nothing…

No. 3: But then again, something just came up right?

No. 11: Yes, yes.

No. 3: A closed system…

No. 11: Yes, yes, but…um…that is also what I am saying. If we have an interface or something like that, then we can usually communicate with them, but if they have closed their systems completely then – of course – we can’t do it.
No. 5 settled the argument by repeating his offer to develop this internally in the CS-group, but then raised his concern regarding the research monitoring, which might also include some development cost (that the CS-group should not be penalized for). The researcher (No. 9) was asked to make a note on what he exactly needed. But this also needed to be integrated with everything else, and so No. 8 (the project team leader) suggested that yet another meeting should be held between the control system supplier, an electrical engineer and the researcher in order to resolve this. No. 1 (design architect) then raised a concern that was formerly raised by No. 7 (the other design architect):

[53:40] No. 1: “There is a concern which I need to put on the table. There is a lot of technology sneaking in [to this project] from every quarter…and as I understand it…these valves…how they work during the year and how much motor capacity that is running…the situation where the valves are opening and closing during the day in relation to injection of air and the position of the sun…it is a concern if people are to work peacefully…and there is some devices which are working then I believe it ‘removes a lot of the experience of such a house’…so therefore I need to know something about how it runs…because before we heard, when you opened up the window…the noise which was generated by it…if there are people who are to sit and work and it is something that runs automatically…

No. 11: You can control it…
No. 1: Or is controlled from the outside, then I think it will be extremely stressful in such a house. [54:47]

The supplier assured that the user could over steer the system but expressed concern whether the user would remember to ventilate. The architect argued that it was the users ‘right’ to choose if he wanted to sit in a bad indoor climate. The architect continued:

No. 1: Yes, if I was to say how I would prefer the system, then you would have a summertime situation and a wintertime situation, where in the summertime these valves were open and it provided the air-change that is was capable of and then in the winter you could close them and you would inject the air via this [mechanical] ventilation system...and nothing more...

And so focus was back on the fundamental ventilation principle. And so no. 5 said:

[58:55] No. 5: I think that…from what I hear, you [looks at No. 1] would really like a very simple system...
Thus, No. 5 reformulates what has just been said (that was in favour of mechanical ventilation and user autonomy) into an argument of ‘simplicity’, which seemed to be in favour of natural ventilation. The architect accepted this and said:

No. 1: Yes we would have come far…(No. 5: “Yes”) No. 1: if you could arrive at a point where the house was so simple and well-functioning in its arrangement…in relation to light, heating etc. and comfortable…and we have spoken about having these phase-shifting materials inside which could absorb and release moisture during the day…so that the air quality, that is you had a balanced humidity in the room, so the need for air-change can be effected this way…um…and it may be a bit of a stone-age approach to it, but I am really concerned that in a dwelling you have so many technical solutions which are to “say” something…not much sound is needed – when you sit all by yourself – for it to become extremely annoying.

And so the design engineer came back into the discussion:

No. 12: No but you can easily have a system where it is open when it is a certain level of temperature and then you have the possibility of closing it…with a button…and that…
No. 11: Or the remote control…
No. 12: that is…it works you see…then you get a minimum of inconvenience…[looks at No. 1]

The video recording ended a few minutes after.

**Meeting 2: Design meeting the 23rd of April 2009**

The second meeting was held in an office at the CS-group control system supplier. Accordingly, the meeting was about the configuration of the control system. There were two new participants present: a mechanical contractor representative (no. 17) and another researcher from the university, who was expert on LED lighting (no. 16). All participants (except for the cameraman) can be seen in the picture 6.4.3.2 below.

**Setting the meeting agenda**

After a brief conversation between the project team leader and No. 16 about her role in the meeting the project team leader set the meeting agenda; it was about how to provide a control system that would work and fulfil client needs. The client representative commented on this:
No. 3: Yes, of course we need a house that works…a good indoor climate…and then there is the other party – [the name of No. 9] right? Um…so one (we) expect that you provide a minimum description of requirements for this, which makes the house work…the way we imagine it to function…and that is, I guess, what I will nod to at some point…we do not want a kind of flagship…um…which is capable of various stuff we do not need…it is some basic needs that we would like to have fulfilled.

No. 12: Yes, it is…and then maybe a little bit more…which you can take out again if you like…

No. 3: Yes, I think we should bring it up, when we get a little further…this we do not need but it would be nice to have…you know nice to have and need to have.

[17.19] No. 12: But in general what we have done here is…actually not enough to make it all…

No. 3: We need a house that works…and then [Name of No. 9] has some additional wishes.

No. 9: “Yes that I do”

[Laughter]

So the client signalled that he did not want something extraordinary whereas the engineer indicated that the current project description did not contain all that was needed to make it ‘work’. No. 16 was then introduced and they agreed that another meeting
should be held with specific focus on LED lighting. However, No. 16 chose to sit in on this meeting. The project team leader then asked No. 12 to go through the project description regarding control systems. Nonetheless, in continuation of the talk about LED lighting they started discussing what this meeting was about; the control system also included control of light. No. 8 ended the discussion by stating that the lighting discussion would need to wait – otherwise they would “get into too much flickering about what they were actually talking about”. So, almost twenty minutes into the meeting the meeting actually started.

An outline of ventilation and heating systems
The design engineer briefly explained the mechanical system, which still included some kind of mechanical ventilation, natural ventilation, solar collectors and solar cell panels. The exhaust hoods operated separately. The architect asked if it was completely separate and whether there needed to be filters. He was also concerned about how many lead-ins that would run through the façade. So they discussed the reasoning behind this solution (again) and ended up with the same result. This time the engineer referred to some calculations, which had been made. The engineer continued:

[24.45] No. 12: An alternative would be...well no...this we think would be the most sensible thing to do and it is of course also why we have done (described) it like that...and then we have also looked a little bit on the floor-heating system with regard to...there we have reduced...the floor-heating so it is right-sized...we don’t need the effect which this kind of heating-system can produce...so it is adapted so that...so...there isn’t floor-heating in for example the corridor area....
No. 9: Um...it may not be my area...wouldn’t be smart to make it big for the solar thermal collector system, so you could lower the temperature, when you have a high...I have just thought about that...[25.51]
[Silence for 8 seconds]
[25:59]No. 12: Well of course you would...well yes that may be, but there is also a lot of cost associated with it...
No. 9: Yes, yes...
No. 12: One square meter...this is a batten floor so it is “heat-distribution plates”...so it is the most expensive solution we are using right now...so if we can save just one m2 then it is...is it 900 DKK saved? [looks at No. 17].
No. 17: That is the number that I can remember...that was the argument initially to say that...

The engineer almost opened up for another suggestion in relation to the exhaust hoods, but chose to leave it as it was. He then moved on to describe how they had ‘right-sized’
the floor, but the (low-energy) researcher interfered and asked whether this indeed was a good idea. It then turned out that the ‘right-sizing’ was more a trade-off between cost, the type of floor they would like (aesthetics?) and technical performance.

Measurement and data logging

No. 9 then asked how the logging of data worked and what kind of data he would be able to retrieve. The ventilation system was controlled via measurements of temperature and humidity. However, the low energy researcher had experience of very high CO$_2$ readings in for example bedrooms. He furthermore stated:

No. 9: It depends on what...It is in any case for sure that I will have a CO$_2$ measurement device in the rooms...[puts his hand on the table to emphasize his claim]
No. 1: In all rooms?
No. 9: Yes
[Laughter]

Thus the participants seem to think it was funny that No. 9 made such an absolute claim. It is likely that he somewhat lacked authority because of his young age and function as a researcher (student) on the project. However, No. 12 supported No. 9’s argument and said that based on the information provided by No. 9, they should also control by CO$_2$ readings. The supplier had a sensor that could measure all three variables.

They then moved on talking about the control touch panel(s). The engineer would like to have only one centralized panel where all functions could be controlled. The supplier had a touch panel under development, which should be ready in a month’s time, but it seemed that they usually customized it to fit the actual needs of the customer. So they started discussing what the users should be allowed and not allowed to control; natural ventilation and floor heating might for example work against each other, if the user meddled with it. They also discussed where the touch panels should be located. No. 9 then asked about what readings could be retrieved from the solar-heating system (which was provided by another CS-group supplier). They did not really know – No. 5 had not been able to get hold of the solar heating supplier. A bit after No. 9 continued:

No. 9: I have quite a long list here of what we wish to measure on the solar-heating system [No. 1 giggles]
No. 9: But I don’t know...if it isn’t recorded then....[No. 10 comes back]
No. 5: If it is a wish-list then we can just take it with us...but normally you only get two to three wishes from a wish-list (No 5. and No. 10 laughs)
Clearly No. 9 did not have much authority – to some extent they laughed at him. No. 10 had collected the sensor which was able to measure heat, moisture and CO$_2$. It was passed around. No. 1 then asked:

No. 1: Is there going to be a wire attached to it?

[45.33] No. 10: Yes, there is going to be “I-bus”…”conex bus”…
No. 8: What are you saying that is going to be attached?
No. 10: A “conex bus”, which was previously called “I-bus”…and that is what most of our…or some of our control system is based on…
No. 1: I’m just thinking about…when you mount such things on the wall…how do you hide the wire?

Obviously the architect interfered when he sensed that something might affect the appearance and asked a very simple question. However, the technician from the CS-group supplier clearly spoke in a different language. No. 1 asked for a clear overview of “these things” so something would not “pop-up” and suddenly needed to be connected with visible wires. No. 8 (the project team leader) described a procedure for detailing this in the latter “detailed design phase”. They then talked about how measurement of energy consumption was performed, which the design engineer described. He ended up saying:

No. 12: “…and then a separate energy measurement on the dwellings and then separate consumption-measurements on domestic water, measurements on dwellings, the main consumption, right? Which is also connected to your system [looks at No. 10 and 11]…but that is rather traditional to connect consumption meters and energy meters to the CTS system…
[48.41] No. 10: Yes…now you wrote CTS and…I don’t know if it is us who…(??)...the CTS?
No. 12: Yes, it is…
[Moderate laughter]
No. 10: Well it normally isn’t…we don’t have a CTS system…

No. 10 explained that a CTS system is more advanced than what they were providing. No. 5 continued:

No. 5: But I could be curious to ask what kind of system it is…because there is also going to be some signals to campus…You have some demands with regard to…
No. 3: Yes, well [No. 17 sneezes]…because I can’t see the purpose of it…and I really can’t see the purpose of [name of the university]…now I’m thinking of the campus side of it…should interfere in the matter….but I will discuss this
with them...we [will have a meeting in?]...this meeting room...because if they are going to interfere in this as well, then it bungles...
No. 9: I think so too...
[Laughter]

This illustrates client diversity. The client representative wanted to keep the campus administration out of the design process, but it turned out that he could not completely ignore them. They discussed this for a while – what were the needs for operating the facility and what should the campus service be able to do? It ended up in a technical conversation about how things could be controlled via web-access.

No. 12 then redirected focus towards the subject about data from the solar-heating system. No. 10 was collecting the CO$_2$ sensor-device, when the subject was discussed earlier on, but he had worked with the system before and was therefore able to provide some additional information. However, he could not answer all questions so they decided to call for a separate meeting with the solar-heating supplier. No. 5 suggested that this should be an internal meeting in the CS-group. However, the control system supplier argued that it could be done via email, because it was only a matter of what data they could provide – it ran as a separate system, so no control should be done (this was backed up by the design engineer). No. 5 then informed that it would be associated with some extra costs for the control system supplier to “provide” the data from the otherwise closed solar-heating system. The design engineer then said:

[1:00:20] No. 12: But there is...there is a lot of interesting stuff that normal residents will...what happens in that kind of system...it is fun to see how much...um...energy that is provided by solar energy.
No. 5: Now I actually don’t know what kind of system that it is supposed to be...we have in reality skipped to talking about solutions before we have clarified whether we are driving a FIAT or an OPEL or a Rolls Royce. And if we are driving in a FIAT then we don’t get this information but if we choose to drive the Rolls Royce then I actually believe that you [points at No. 10] are able to deliver this kind of information. That is something you can observe in [name of a reference] and also in [name of another reference]. Here you can see precisely how much heat is used, how much solar-heating is produced, how much solar electricity, if there is solar electricity included, that is something that you can also register in your database, and so all these types of information can be included.
[1:01:17] No. 12: But that I think is (??) if it is something you want to exhibit, then such things are quite fundamental...
No. 1: I look at it, more like...the house should be a kind of “horse-sensible” and proactive with regard to a scenario where we have dwellings where these things gets more and more integrated and almost something you can buy in Silvan [do-it-yourself market] to build in...There is probably some way to go before that happens, but [ ?? noise No. 5 pulls out his chair and plugs in the power cable to his laptop] it must, I guess, save power in the system and that will disappear when a cloud passes the sun...I don’t know for how long it keeps being interesting....?

No. 12: For an engineer it will be....

[Laughter]

This illustrates the stereotypical differences between the interest of engineers and architects. In addition, No. 5 signalled that “you can get everything as long as you pay” and although the architect and engineer continued their argument, the economical aspect became more and more predominant in the following discussion.

Relating design to costs

The architect continued:

No. 1: [...]...I don’t think it is particularly important, because you know it is there and you may be able to read it somewhere but to say “wow, now it is on 18” or “now it is down to 9” [No. 1 makes a ‘caricature’ of it] I don’t know how exhilarating that is...just to say things bluntly

[1:03:217] No. 12: But you can always...it is always a matter of how you configure your interface to the user...you can always make some sub-menus which uses these things...

No. 1: Yes, yes and in the end the system will become so complicated and expensive to get incorporated into the dwelling if everything needs to be run via the same screen.

No. 17: Isn’t also a question of...we talked about – in our meeting, also – that we are creating...in connection to our project there is a budget and we are trying to figure out the cost associated with constructing this...if you are comparing with FIAT and Rolls Royce, which is very reasonable, maybe we should try to display some bullet-points and say: this is what we really want and what are the associated cost, [name of control system supplier]...

[Some of the participants says “yes” – e.g. No. 1 and No. 9]

Here the contractor (concerned with costs) actually suggested a kind of value-engineering exercise. Now the project team leader became active:
[1:04:16] No. 8: That is also the output of this process to say now we can see that the systems fundamentally can function together what are then the associated cost...and then we can... (??)...

[Silence: [1:04:27] to [1:04:34]]

No. 12: It may be to go with the slightly more expensive and then see how much money that are available and then cut some cost and adjust...

No. 5: But when you are here listening to what models...or what it is that is to be controlled...what are you then thinking? What kind of cars are we driving?

[looks at No. 10 and 11].

[Laughter]

No. 5: Yes, well there are a lot of experts at different places with wishes...

No. 10: Well, there is no question about that all these wishes will cost time and time cost... (??)

Clearly nobody had an overview of the project or the associated cost, which was probably because they needed to design something (more integrated) first. Thus, the safe answer from the control system supplier was to insinuate that it would become expensive. The client then came up with at suggestion:

[1:07:04] No. 3: If we are just to turn things around, then, you see, we have a budget...um...now I don’t know if you have seen it. (No. 10: “no”) No. 3: There has been established a budget, so we know, you see, how much (money) that is allocated to CTS and automatics...um...we could send this to you...and play with open cards and say everybody know the budget and then we must say; well this one – that is not possible, here we must start somewhere else...

[1:07:30] No. 8: To turn it the other way around and establish the level...

No. 3: Yes because you probably have some experiences from over there, from [name of reference] which we might be able to employ...

No. 10: Yes

However one of the control system supplier representatives suggested the opposite:

maybe we should try to display some bullet-points and say: this is what we really want and what are the associated cost, – that the engineering “play together”...for example that we don’t have the heating system working in one direction and the windows working in another – that is a basic error, which is often made, when it needs to be done at a low-cost...that is the integration of the two systems...
No. 3: I completely agree with that but if we...if we say that – now I just say something – that we go over budget with 200%, just to say something, then somebody, then I need to go and find additional funding, right? If that is possible...
No. 9: Yes please...
[Laughter]
No. 3: It may be that this is the model that we all want, but then...then we must do something to get it.
[Silence for a few seconds]

The design architect then (again) argued for simplicity. The design engineer continued:

No. 12: What we are doing here is just bringing various systems together to form one system (looks at No. 1, who says “yes”) No. 12: We use one sensor instead of three, so we avoid having...
No. 1: I completely understand (some laughter)
No. 12: We simplify it...
No. 8: It may be that this is what we are doing it is just when we talk this much about engineering then it can give the impression that more and more engineering is added...and it may not be like that it may actually become more simplified as you say, but...um...
No. 12: At certain points I think that it becomes more straightforward. You have fewer of...fewer of everything...
No. 1: Well that is swell...
[a few seconds of silence]

So, the engineer tried to lay it out as if it was simplicity that they were working on – however the architect did not seem convinced, but he (they) probably did not have the technical knowledge to truly oppose this view. No. 8 then suggested a process forward, where the CS-group explored how the individual systems could communicate and afterwards tried to price the solutions. It was also suggested that an additional meeting should be held where the cost, the solutions and the budget was discussed with the contractor and client. No. 8 added that something similar was going on with the exterior and interior work. No. 12 (the design engineer) then asked the control system supplier to provide a more detailed system description based on the material provided and the researcher’s wish-list. However, No. 10 in return asked for an “interface-description” (to clarify the interfaces between the solar-heating supplier, control system supplier and mechanical contractor). This suggestion was backed up by No. 8. The engineer then replied:
He did not seem to have an overview and his attempt to pass the work on to the component supplier failed, which was probably why some of the participants giggled. The client then emphasized that when it came to estimating, then the additional cost of retrieving data for research purposes should be estimated separately, because these additional costs were funded by the research department. Then No. 9 asked a pertinent question:

[1:16:18] No. 9: Yes, but can I just ask a maybe stupid question...wasn’t there something about... in the beginning...that all the money hasn’t been raised yet...? (looks at No. 3)
No. 3: Yes.
No. 9: Is it still like that...I haven’t heard...
No. 3: It is still like that...
[Laughter]
No. 9: So we are actually sitting here and designing a house, which may in fact never be realised...
No. 3: Well, I don’t believe that...but um...[nods his head]
No. 9: Okay.
No. 3: In principle yes...
No. 9: Okay
No. 3: But you don’t commence the design of this based on a belief that you spend 3 million DKK without...I can’t, I can’t... [No. 3 speaks very quietly]...
No. 9: No, no...but who...[?? There is a lot of noise from other participants turning pages in their documents]
No. 3: That is (??)
No. 9: That’s good...Okay...

So there was actually not enough money, but the client representative reasoned that there was no return when the project had commenced and money was already spent. It seemed that No. 9 could afford to be very explicit about things which the others did not speak of. No. 1 then retrieved a number from the budget which was allocated for “CTS and heating” and asked what the supplier representatives’ experience told them. No. 10 answered:

No. 10: Does that include components or just software or...?
No. 1: No, yes, well...
No. 17: (smiles) There are some interfaces which are not entirely...we (looks at No. 12) talked about in our meeting the fittings for injection, so we need a VAV-fitting which can range from 0 to 30 m³ per hour and that I don’t know if exists....but I will try to find out...and I also don’t know if the valve openings are to measure...and these kinds of things...[...] (raises his shoulders)....

[1:18:32]: No. 3: Well we probably have to produce such an interface note...right...who supplies what...

No. 5: Yes, well off hand I would say...if this is what is allocated to the CTS system, then it is allocated to electronics and consulting where the hardware will be included in some way in the solutions which will be chosen...[...].

No. 12: Yes...um...it is primarily wiring we are talking about...

No. 10: Now we have spoken about a lot of things...there is...which will fall between two stools...because there are not many who know...exactly what each is going to provide...

No. 8: No, but that is an interface description with regard to the tender-documents...or project brief...which [name of the engineering company] is going to make as a basis for estimating. That is it...

So there were many unknowns and to some extent the participants seemed paralyzed (number 17 raised his shoulders – he did not know what to do). Even though the project team leader tried to pass it on to the engineer, they (again) fell into a discussion about technical details – this time about solar shading, windows and how they could be operated – although they were discussing how to manage the financial side of things.

The way forward

After about ten minutes No. 5 tried to summarize the different forthcoming meetings that were to be held to clarify the different issues. The design engineer again asked if the control system supplier could provide a more detailed description of what they intended to do. Then they discussed the actual content of these meetings. No. 5 suggested that it all got complicated because of the monitoring for research purposes. Subsequently, after a long discussion about how to retrieve data in relation to ventilation, the project team leader then concluded that it should be treated as a separate project:

No. 8: I think that the sequence of this is...as [name of No. 5] says it seems so simple, right? If we have a sequence of where we examine the project – the control part with regard to the basic functions of the house – so we are certain that this – from a technical perspective – works. Then we have [name of No. 9], who “stands on the sidelines” who say: can we...asks these questions: Can I measure that can I do that...then the answer may be: yes that is possible be-
cause it is a part of the project or it can be: No you can’t, if you would like to be able to do it, then the costs are 20,000...

[1:39.34] No. 3 says something...

No. 8: Yes, because we then avoid talking about two projects...we have the house that is the basis...the measurements should also be included but it is associated with its own cost.

Thus, they tried to cut down on the unknowns. After some discussion they agreed to this suggestion. Then they started talking about when to meet. They had talked about an excursion to see a reference, but No. 8 argued that this would raise even more things to consider – so maybe they should prioritize clarifying the interfaces. The client agreed. The project team leader reminded No. 12 to make an interface-note prior to their next meeting and summarizes the meeting schedule. The project team leader then asked about the client’s “review process”:

[1:55:57] No. 8: The process of reviewing the product of phase one – together with the client, with campus or with you (looking at No. 3) or the steering committee – who is in this group and how...?

No. 3: I have been a bit uncertain about the schedule, so therefore I haven’t done anything because I’d like to discuss this with you; are we going to be on schedule or should we give it a little more time or...can we have a look at that? (No. 8: Yes) I can feel that it is going to very tight...um...are we able to make it? I think we should present... this output that we produce we need to present to [a name] and the steering committee

No. 8: Yes, and we must say that with the present budget it would be possible to expand in order to get better quality – it may make sense to spend four more weeks...I could imagine that...

No. 3: But what ...they may do that, when they get a status on what each party has spend...of time [No. 8: “Yes”]. No. 3: Just so we have an overview. So if we could have a look at that in our next meeting – that each participant assesses cost and time.

The project did not seem to have the sufficient funding and the participants had no overview of the costs or time – so the team leader suggested asking for more money to improve quality. As a responds the client representative asked for (at least) an overview of the time and money already spend.

They shifted focus and informed each other about various things like solar shading, plans for a mock-up, geotechnics and things to consider in the district plan in order to get approval from the authorities. No. 5 also asked the client and the architect to con-
sider changing the type of window – the CS-group had changed its mind as to what product they wanted to test/promote. And so the meeting ended.

**Meeting 3: Design meeting 30th of April 2009**

The third meeting took place in an office at the university. There were two new participants: No. 18 and No. 19 who both represented the engineering consultant’s electrical division. Initially No. 1 was not present in the meeting.

![Picture 6.4.3.3: Design meeting 3](image)

**Interface coordination**

The meeting started almost where the former meeting ended; with a discussion about who provided what:

No. 12: But…um…the interface between [the solar-heating supplier] and [the control system supplier], who does what when they connect to their plant is, I guess, an affair within [the CS-group]…how they do it is, I suppose, not our business. [looks at No. 8]. We, surely, should not provide an interface note about that…they should just do it.

No. 3: Yes we should just write what they are to deliver. What they choose to do internally...we don’t care about that.
Now when the CS-group representatives were not present, the interface-note became less extensive. The design-engineer continued:

*No. 12:* We must have their project (description), right? They must formulate a project (description), which...which...
*No. 8:* A supplier project description...
*No. 12:* Yes...so we can see that it is going to be the way we want it – have we forgotten something or is there something which we have misunderstood or something...they must provide a project description...
*No. 8:* So in reality what carries...we can take the project description and give it to [name of No. 5] or [other representative from the control system supplier] and say we would like (you) to make a (lighting?) and system description as a supplier project description...
*No. 6:* That would be very, very nice...and start on it as fast as possible.

They continued talking about how to integrate No. 9’s monitoring “wish-list” items:

*No. 12:* There are a lot...I think it is half of them, which are included in the project. But the potential pitfall in this...the way I see it...when not integrating it is that we just provide a system which fits this (description) and then this needs to be incorporated...that may entail that you would have chosen another system from the beginning if this (points at the wish-list) was incorporated...you can’t...
*No. 8:* But can you then give them the challenge and say: You must within the budget constraints provide a system which can accommodate both this and this (points at both documents: the project description and the wish list).
*No. 6:* Well, at least it would be nice if they had an eye on this concurrently...they can have in mind...that this is the next step.
*No. 12:* It should be adaptable to (these) future requirements, so it can be incorporated...these items.

They were reconsidering what had been decided on the last meeting with regard to separating the ‘two projects’ completely. The challenge to accommodate this was transferred on to the CS-group supplier (who is not present at the meeting). The client representative again brought up the issue about clarifying interfaces between the mechanical contractor and the control system supplier. It turned out that the design-engineer in fact had made a preliminary interface-note that described the interface between the mechanical contractor and the CS-group. They agreed that this note was a good proposal, which the other parties could comment on. However, they continued to discuss the interfaces anyway. Then No. 19 suggested that they considered the tendering in relation to the actual wiring on site – if this was included in the control system suppliers ‘package’ it
would probably be more expensive than if a local electrician was selected separately. Then they discussed what this job actually included because maybe the mechanical contractor would mount the cable tubes.

**Strategy**

The client representative broke of the discussion:

[26.13] **No. 3:** Don’t change this (presumably the interface note) sent it as it is…
**No. 6:** Yes.
**No. 3:** And then you must coordinate it afterwards…
**No. 6:** Yes.
[silence]
[26.29] **No. 3:** Because they still need to provide the project (description) to you, so they might as well live with the belief that it is them who performs it, then we can…[points to No. 19 and giggles – laughter from some of the other participants].
**No. 3** makes a brief comment [but there is too much noise…]
[silence]
**No. 8:** Nothing more…?
**No. 12:** I think that’s it with interfaces…I only think it is relevant to say that we take care of the interfaces between Client (?) and [CS-group] and what is internal in [the CS-group] they must solve themselves.
**No. 3:** Yes, they must solve it themselves.
[silence]

So the suggestion about bringing in a new contractor was kept as a concealed agenda and now everybody agreed that the design-engineer should only consider the interface between the mechanical contractor and the control-system supplier. Then they started making presumptions about what the CS-group representatives were thinking:

[27.30] **No. 3:** And the reel question, [??], is: can we deliver this for 250,000 DKK…
[someone, presumably No. 8, says “Yes”]
**No. 3:** You could see what they were thinking when they heard the number…[No. 8: yes]…No. 3: it was not 250,000 DKK…it was a lot higher…they were very surprised. You could see it in their eyes – they were surprised about the price.
No. 3: [...] They, of course, think of everything...they also think of control devices in windows and so on...and here the internal interfaces...they are pretty tough right now.
No. 6: Yes.
No. 12: Yes, they probably have a lot of internal “boxing” which costs time
No. 8: Yes, that is their own idea-development...[No. 3: Yes]...No. 8: It is not something you can...transfer to this...
[28.35] No. 12: They also have a huge interest in seeing (?) their products coming into being...
No. 3: Yes! If this come off – it must of course – then it is a magnificent project for them to display.
No. 12: It is also a bit strange that they have products...that it isn’t plug and play where it fits together...
No. 3: Well, I think that it is still so novel...and the financial crisis has accelerated this whole process...um...which makes it even more interesting today...we’ve been supposed to build low energy housing for a long time – or had a wish for it – but the financial crises has accelerated it and the energy crises...
No. 8: I also think they have problems of keeping up...
No. 3: Yes, I also think so...
No. 8: They can’t find the resources...they [?? Noise]...they are overbooked.
[29.34] No. 3: And my impression is that [name of No. 5] has a lot of power in this game, because this need to...you see...they need to be able to function together, because it is something they can sell afterwards.
[...]
[30.00] No. 8: And this should be our lever to say: we have 250.000 DKK...and that is it. If it costs 800.000 DKK or 500.000 DKK then you must find 250.000 DKK if you want it – otherwise it will be 250.000 DKK with another vendor.
No. 3: Yes.
No. 6: But it is actually...(...)it is CTS and there are many others who can provide CTS, so it isn’t...that is not how it is going to be – they are not self-elected...

In light of the limited project resources a strategy for bargaining with the CS-group was emerging. Then they started discussing the content of an upcoming meeting with the solar-heating supplier and who should be invited to the meeting. After discussing whether or not a geotechnics report had been issued (it had) they moved on to the next item on the agenda.
Cost review
No. 2 distributed some papers showing the contractors estimate in relation to the budget. Initially they talked about how to interpret the way the estimate and budget was set up and compared. They reviewed the estimate and discussed the items that were associated with uncertainty (e.g. type of windows). The contractor had come up with some suggestions to make savings. However, No. 8 emphasized that some of the things had to be discussed with the design-architects. After going through the numbers they discussed what the purpose of the LED-lighting meeting was, and how that was going to fit into the project. Then they took a break until the design architect attended the meeting.

Façade cladding
One of the contractor’s change-proposals was substituting the metal studs with laminated wood studs, which had been used in other ‘sustainable’ houses. However, there was a fire-issue which needed to be taken into consideration and which needed to be seen in relation to the façade, where the architects were considering wooden panels. This led to a conversation about the façade cladding. The architect had thought of using a certain kind of panels that were supposed to be ’sustainable’, but he did not think it looked right:

No. 8: Isn’t there other variations…
No. 1: Yes there is…
No. 8: like sand blasted or…
No. 1: Yes, but they continue to be very sleek…(??)...very precisely cut...central European product...and you can get it with all kinds of inserts and cut with groove for assembly fitting...it can do many things, but...um...it’s expression for a sustainable dwelling...I don’t think so…

The client representative made a comment:

No. 3: Now I should be careful about what I say, because [name of the university] may not have the same opinion...a panel like this...from a maintenance perspective it would be superb…(?)
No. 1: That is for sure...it only needs to be cleansed…
[8.45] No. 3: Then..um...then we can discuss sustainability, right?
No. 6: Yes
No. 1: Yes, yes…um…that is right.
No. 6: At least I think we should dig deeper into how what it is made of and…
No. 1: We have to…
Accordingly, maintenance was also something to consider and the client representative insinuated that here a trade-off might be considered in relation to sustainability. They continued to discuss various alternatives. When the discussion seemed to be exhausted (No. 1 started eating a sandwich) the project team leader asked No. 2 about some additional questions which he had issued for discussion with the design architect. Focus was then directed towards the guesthouse kitchens.

**Sponsorship**

In relation to the kitchen they started talking about fittings and the design engineer suggested a particular brand that had a special feature:

No. 12: *If you want it to provide a lot of water then you need to actively keep the handle up…right? And you save…studies have been made and you save a lot of water with this system…*

No. 18: *They are just really annoying…*

No. 2: *They are extremely annoying…*

No. 12: *I have two at home and I think they are great (No. 2 laughs out loud)...I only use the function (shows with his hands that he “pulls up the handle”) when I need to fill a bucket or….something like that…otherwise you only go up to…*

No. 2: *Isn’t there anybody else who produces this kind of stuff…?*

No. 6: *Yes but then it clicks and stays there…you pull it up and then…(?? No. 2 laughs)*

No. 1: *Well I know this…the only reason for me to….is that I don’t think they look very good.*

No. 12: *No they are not…(No. 3. smiles)*

No. 1: *And they are not really Danish…if it is a strategy to keep it within the borders…*

No. 12: *It’s Scandinavian…*

The participants’ opinions of the solutions were quite explicit as well as their attempts to influence the design to their liking via naming design disciplines (Danish, Scandinavian). Then they started discussing how they could save money on more sponsorships (e.g. for domestic appliances). They believed that a lot of companies would like to display their products in the sustainable guest-houses for free. However, they were a bit concerned that it might become a bit too political and consequently difficult to handle the publicity that each of the sponsoring companies would require. The electrical engineer suggested asking an electrical component supplier to give a good price in return for publicity. Then the client representative interrupted and said that the intention was not
to generate a profit, but to generate more value into the facility. This ended the discus-
sion and shortly after the meeting was adjourned.

6.4.4 Analysis

Hermeneutic inspired analysis

Source criticism
The video-recordings can be considered as remnants of what was said and done in the meetings. However, one can only speculate about what the participants thought or ex-
perienced during the meetings. Also, the above representation is only to be considered as a narrating source, which serves to highlight the content that was deemed relevant to the research. This may of course be distorted by the researchers selective choosing of quotes and interpretations. Since no interviews where conducted to test the interpretations, this is a relevant bias to consider. However, the analysis has been sent to the key participants for comments and approval, which is likely to minimize researcher bias. The CS-group chief representative (No. 5), the low-energy researcher (No. 9) and the chief design-engineer (No. 12) were the only ones who responded to the request for approval – they all approved. Of course the participants may also have been influenced by cameraman and the video-recording. However, considering the tactical discussion about how to bargain with the supplier, it did not seem as if the participants were very cautious about what they said. In addition, a lot of the discussions were purely of a technical sort and it is unlikely that the participants would have any hesitations regarding this being recorded. Regarding criticism of dependence, it is obvious that any in-
formation brought to the table by the participants cannot be considered as facts unless it has been checked via other sources. The validity of the information reported by the par-
ticipants is, however, not considered important to the research topic.

The conversation view of design
This case-study highlights the interdependence of design tasks. To provide an overview, figure 6.4.4.1 is a rough outline and categorization of the design elements (the squares) discussed in the first design meeting. In addition, the figure shows the linkages between elements and various qualities, norms or values (rounded squares) brought forth by the participants as arguments for or against the various alternatives discussed. These qualities can also, within the terminology used by Lawson (2005), be understood as ‘design constraints’. Henceforth the qualities, values and norms associated with a design element will, however, be referred to as ‘disciplines’ as they may not, necessarily, reflect the values of the participant who mentions them, but serve as mere arguments for a pre-
ferred solution (that may be preferred for a lot of reasons). Nevertheless if the qualities, values or norms are accepted as valid by the group they impose a ‘discipline’ on the design development. The figure should be read from the upper left corner, where it says “ventilation”. This is both where the conversation started and ended (hence design element number 0 and 12). The numbering of the design elements roughly reflects the sequence in which they were discussed in the meeting.

In the context of design management, it would then be somewhat tempting to try to organize the design elements in a more ‘clever’ way – for example by means of the design structure matrix (cf. chapter 5.6). However, the purpose is not (at this point) to describe how the meeting should have been conducted (and the DSM would probably show one big pile of nested tasks). Instead the flow chart serves to illustrate the conversation view of design. Accordingly, within Schön’s (1991) terminology, the problem framing was for example changed in the first meeting from ‘space for ventilation routing’ to ‘ventilation principle’. Also, the configuration of windows in relation to daylight and functionality became something that should relate to ventilation as the discussion progressed.

As pointed out by the CS-group chief representative in a subsequent telephone meeting, it is very likely that the participants, at least initially, had different perceptions of the meaning of a ‘window’. Thus, the conventional understanding of a window is that it is a medium through which light can be transferred. However, a window may also be understood as an active component in the ventilation system, an aesthetic feature and/or a medium of passive solar heating. The way the designers understood the notion of a ‘window’, is likely to have affected the way they viewed (framed) the design problem.

Within this conversation the participants’ ability to frame problems and name design elements (furniture layout, façade, windows) and associated disciplines (good comfort, low energy consumption etc.), which should be considered, and could provide a sequence of arguments for a specific solution, seemed evident.

However, the naming of design elements and associated disciplines appeared to happen in a rather unstructured manner as the participants came to think of them and as they were deemed relevant in the discussion of other interdependent design elements. Especially when disagreement surfaced, the naming of disciplines became reactive and somewhat defensive e.g. when discussing ventilation principle. Also in the above discussion about the handle for the water tap, which the architect did not like because of its appearance, the discipline of ‘buying Danish products’ was suddenly considered. Yet, if one adopts a conversation view of design this may seem natural. As the situation ‘talked back’ the participants reflected on it and sometimes responded by naming other disciplines, which had not been (explicitly) considered in the discussion. This sometimes led to a reframing of the problem.
A less sophisticated interpretation would be that the somewhat random process was due to the (lack of) chairing of the meeting. I should, however, be noted that construction design meetings in Denmark are usually more relaxed than for example in the United
Kingdom. In addition, as described in the theory chapter 4.2, it is not uncommon for designers to ‘drift’ and behave opportunistic in relation to planning structures – especially in the conceptual design development (Cross & Cross, 1995).

How did the participants’ perception of value manifest?

A few explicit value judgments were sometimes made by the participants. For example in the second meeting the engineer stated his personal opinion about touch panels (“it is fun…for an engineer”). In addition, in the second meeting, it was quite obvious how the architect valued aesthetics e.g. he was concerned about visible wiring and how many lead-ins that would run through the façade. Likewise, in the third meeting the design-architect directly stated that he did not like the appearance of the water tap handle. This seems almost stereotypical and indicates that the participants’ preferences were heavily structured by their professional background.

It also seems that perceptions of value (which are different from values) manifested in the naming and priority of disciplines. A rather clear example was provided in the discussion of ventilation principle, where the CS-group representative and the engineer were constantly looking for arguments (disciplines) in favour of respectively natural ventilation and hybrid ventilation. It looked as if the participants were trying to persuade the group to support their preferred solution (with some help from their company allies). Of course one should be careful about making such interpretations based on observation – we cannot know what the participants were aiming for or thinking (subsequent approval by the participants does however strengthen the argument). It was, nevertheless, apparent how the design engineers constantly mentioned disciplines (low-energy consumption, draught, flexibility in furniture layout) in favour of hybrid ventilation, whereas the CS-group chief representative was either (1) questioning the supposed links between design elements and disciplines (does hybrid ventilation equal low-energy consumption?) or (2) looked for ways to offset the disciplines imposed by the design engineers (draught can be solved by having special draught windows; flexibility can be solved through intelligent window operability). In addition, the CS-group representatives found new disciplines which could ‘work’ in favour of natural ventilation (e.g. simplicity). Within Schön’s terminology, this may be understood as ‘moves’ that work as probes in testing the feasibility of the hypothesis experiment (frame). Thus the apparent argument over ventilation principle may be seen as frame-negotiation, but also a way to mutually learn and qualify preferences.

Accordingly, the case-study showed how the participants in some cases tried to ‘objectify’ decision-making by asking for quantifiable facts. This can, however, also be perceived as an act of mistrust (especially in connection to the design engineer’s recom-
mendations), which again may reflect that the participants had experience of basing recommendations on subjective preferences (opinions) rather than ‘facts’. It may also be an indication of a relatively new-established group, where relations and knowledge of the other participants’ knowledge has not been established yet (see theory chapter 4.3 on communication and group dynamics).

If one accepts the conversation view of designing and specifically adopts the idea that values are likely to guide preferences and priority of disciplines, then values consequently led the design development. However, preferences are also likely to derive from a certain familiarity with a specific set of solutions, criteria or issues that is associated with the actor’s profession and/or experience (as indicated in Luck & McDonnell, 2006). This again relates back to the other ‘constants’ described by Schön (1991), which cannot necessarily be portrayed as values. Thus the engineer may have prescribed hybrid ventilation because this has worked in similar projects before. In addition, he may have defended the solution to avoid redesign, although he, in his own house, would prefer natural ventilation. Thus, his proposal may have been a matter of convenience and routine. However, in any case it was not apparent to what extent ‘client value’ was addressed – at least in the first meeting the client was very passive and users were only mentioned a few times (as will be described below).

**Paralysis and ways to move forward**

When considering the second meeting, the data again illustrated the interdependence of design elements and the ‘liquid’ condition of design at this stage. This especially became apparent when the participants attempted to relate the design to cost. However, what seemed most striking to the researcher, was the lack of structure and uncertainty among the participants, which consequently, in the second meeting, led to a fundamental discussion about how to progress with design, estimating and approval (even though the meeting was supposed to be a ‘technical’ meeting on the subject of ‘making the control system work’). From a design management perspective, this is a fundamental thing to consider and not something to be discussed ad-hoc in a meeting about control systems. Again, the participants’ individual concerns and interests seemed to be reflected in the conversation: the client needed to keep his budget, whereas the control system supplier would like to provide (sell) a technical optimal solution (and estimate it afterwards).

In spite of a ‘healthy scepticism’ and conflicting views within this group, which in theory is beneficial to a group (see theory chapter 4.3), group effectiveness did not seem to be at its peak. Thus, one may question whether the interdependency of design tasks and/or theoretical benefits of keeping the design process “liquid” (or set-based) can just-
tify that the only outcome of the meetings was information sharing, identification of ‘issues’ and agreement about more meetings.

Inspired by the hermeneutic circle of inquiry, an interpretation could be that each of the participants had their provisional understanding and perception of value in relation to the final product (the whole), and spoke of the details (the parts) based on their individual perspective. In the meeting(s) they tried to structure a common picture of the whole through conversation in order to understand their part of it. However, since nobody had a common picture of the whole, it was hard for the participants to provide ‘solid’ information about their parts, which could account for all the unknowns associated with other (interrelated) design elements and associated disciplines. The problems were nested as is apparent in figure 6.4.4.1. So it became a circle that to some extent paralysed them (consider for example the discussion about CTS in the second meeting).

It is likely that the ‘liquid’ situation has been further exaggerated in this project because all parties (and their different opinions) were included very early in the process. This connects to what was described in chapter 4.2, about the added complexity associated with group problem-solving/designing (Cross & Cross, 1995). Thus, if the supplier had not attended the meetings, it is unlikely that anyone would have opposed the design-engineer’s proposal (this is, however, not to say that supplier should have been excluded).

Different strategies were then attempted to move forward:

a. Transfer the task of ‘integration’ to one particular participant or sub-group
b. Abstract and isolate problems that can be addressed in other (logically ordered) meetings
c. Reduce the unknowns by consciously omitting certain aspects of the problem
d. Name and prioritize design disciplines to help decision-making

An example of the first approach, is when the design engineer asked the control system supplier to come up with a detailed project description, but in return was asked for an interface-note. The paralysis, as well as the proposed means for solving it, is specifically reflected in the quote below:

No. 10 (contractor): Now we have spoken about a lot of things...there is...which will fall between two stools...because there are not many who know...exactly what each is going to provide...
No. 8 (project team leader): No, but that is an interface description with regard to the tender-documents…or project brief…which [name of the engineering company] is going to make as a basis for estimating. That is it...

Thus the design engineers were assigned the task of coordination. In addition, in the third meeting, the consultants considered to grant the supplier the ‘challenge’ of coordinating the incorporation of the research project requirements.

Concerning the second item, numerous examples are found in the text were problems are dealt with by agreeing on another, separate meeting (this seemed more common than agreeing on a solution). Attempts were also made to arrange the meetings in a logical sequence within the boundaries of the overall schedule. In this way, deadlines would hopefully force the conversation to stop in relation to these isolated problems. This is the traditional planning rationality.

An attempt to reduce the unknowns was apparent when the participants agreed to separate the research part from the rest of the project. The participants apparently tried to arrive at a design-scope, which could be created from experience (the participants’ back-catalogue of references/solutions cf. chapter 4.2). This could then work as a common object for discussion (a whole picture) and a subject for more concrete iteration on the parts (with regard to monitoring).

In addition, where the participants had clear preferences, it enabled them to suggest concrete solutions in spite of various unknowns (e.g. the engineers wish for a centralized touch panel). Similarly, No. 17 suggested that the client’s ‘needs and wants’ could direct the process. However, in order to persuade the group, the participants needed to name and prioritize acceptable design disciplines (comfort, low-cost, sustainability) and argue how the solutions complied with these. Consequently, the naming and priority (valuing) of disciplines became yet another structuring mechanism to simplify and provide direction in the fuzzy design process. This aligns with the soft-system perspective in value management, which according to Green (1994) recognizes that an optimum solution does not exist, but the objective is to achieve consensus about the design problem, the grounds for decision-making and the way forward (see chapter 5.3).

Finally it should be noted that an additional, fifth, strategy to deal with the paralysis was suggested at the end of the second meeting. This strategy was not included as a bullet-point above because it leans towards critical theory. The strategy was to ask for more money – “to improve quality”.

These various strategies may be combined and they are likely to include various pitfalls. For example, when isolating problems and constraining the conversation with deadlines; one may end up with ‘the best we got’ and it may not be sufficiently integrated with other parts of the design. When reducing the unknowns it may result in costly iteration when including them again. However, with the data available, this is all speculation.

Interpretations inspired by critical theory

Power-structures

Power-structures were also directing the conversation. From a critical theoretical perspective the first meeting could be interpreted as a promotion event for the component supplier, who was well represented with 6 out of 15 participants and clearly dominated the meeting. Accordingly, by having the meeting in the CS-group head office, the other participants became ‘guests’, who could experience the wonders of natural ventilation and CS-group products. Nevertheless, it can be argued that this was legitimate as the CS-group also sponsored the project – so they were partly the client in this context.

However, the project team leader may have found it difficult to establish authority, as both the client and the chief representative from the CS-group were in more powerful positions than he. At least in the first meeting, the chief representative of the CS-group (No. 5) was clearly the informal leader in the way he was able to direct and break off the discussion as he pleased (in somewhat collaboration with No. 14.). This may have been a contributing factor to the ‘loose’ chairing of the meeting; the project team leader had simply not been granted the “legitimate authority and power”, which according to Bales (1999:80) is a prerequisite for effective leadership of group problem-solving (see theory chapter 4.3). To substantiate this, a simple count of utterances (as indicator of dominance), made by the four leading participants, is provided in Table 6.4.4.1 below.

<table>
<thead>
<tr>
<th>Frequency of utterances</th>
<th>Meeting 1</th>
<th>Meeting 2</th>
<th>Meeting 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of meeting</td>
<td>2:00</td>
<td>2:15</td>
<td>2:36</td>
</tr>
<tr>
<td>Total number of transcribed utterances</td>
<td>538</td>
<td>915</td>
<td>822</td>
</tr>
<tr>
<td>CS-group chief representative (No. 5)</td>
<td>93 (17%)</td>
<td>101 (11%)</td>
<td></td>
</tr>
<tr>
<td>CS-group representative (No. 14)</td>
<td>44 (8 %)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Client-representative (No. 3)</td>
<td>22 (4 %)</td>
<td>88 (10 %)</td>
<td>129 (16 %)</td>
</tr>
<tr>
<td>Project team leader (No. 8)</td>
<td>29 (5 %)</td>
<td>110 (12 %)</td>
<td>231 (28 %)</td>
</tr>
</tbody>
</table>

*Table 6.4.4.1: Count of utterances made by the four leading participants*
The table shows how the project team leader only made 5% of all utterances in the first meeting, while the CS-group chief representative made 17% of the utterances. As described in the theory chapter (4.3), the change of a few participants in a group can have a significant impact on group behaviour.

Accordingly, the absence of the CS-group in the third meeting was consequential. As it can be seen from the table, the project team leader became much more active (of course there were also fewer participants). It is also interesting how the engineering consultants, as noted above, immediately used the opportunity to alter the decision about providing a comprehensive interface note (and thereby transfer some of the coordination task back to the CS-group supplier). It was also conveniently proposed, now that the CS-group was not present, to give the CS-group the ‘challenge’ of incorporating the research project requests, although it had been decided in the former meeting to separate it from the rest. This may be perceived as way for the engineer to re-claim authority. Thus, the argument over hybrid and natural ventilation in the first meeting may, within this perspective, be perceived as a struggle over dominance and status, which is a fundamental problem in group behaviour (Bales, 1999 – see theory chapter 4.3). Thus, the suppliers questioning of the design engineers expertise and subsequent push-back of the coordination task, in the form of the interface note, may have been perceived as an attack on the engineer’s status. Usually a supplier is not granted so much influence at this early stage.

One may also notice that the participants, at the end of the meeting, started to speculate about the internal affairs in the CS-group and how they could turn the supposed situation into their advantage and further exploit the branding value, which they so strongly believed was associated with this project. Thus, whether or not a struggle over dominance took place, the content of the third meeting seemed greatly affected by the ‘deliberation’ of the influence of the CS-group.

Rhetoric and distorted communication
One may notice how the word ‘simplicity’ was used in the first meeting (and was carried over to the next). The word derived from a discussion where No. 1 made an argument for user-autonomy – the user’s had a fundamental right to close the window (and sweat) if they wanted to. This led the architect to support the idea of hybrid ventilation, so that windows could be closed in the summertime (and mechanical ventilation could take over). However, No. 5 from the CS-Group turned this into a question of ‘simplicity’. With reference to this discipline, the option of natural ventilation seemed more favourable in comparison to the complexity of a hybrid system. Whether this was a conscious act of manipulation cannot, however, be concluded based on these observations.
 Nonetheless, the third meeting shows that at least some of the participants were familiar with tactics and concealed agendas. Accordingly, the relevance of the social process view of designing (cf. chapter 4.2) is highly relevant.

Yet, if one interprets this as a game of persuasion and concealed agendas it is, however, noteworthy that references to user behaviour/preference did occur. The architect argued for user autonomy and the design engineer advocated for flexibility in furniture arrangement. On the other hand, the arguments (again) seemed to be coloured by the professionals own preferences. Thus, at several occasions the architect displayed a disinterest in technology and seemed to oppose intelligent systems, and the engineer’s argument for flexibility might as well be an instrumental argument for mechanical ventilation. In relation to the latter, the design architect (primarily) advocated for a fixed layout, which would reduce the complexity of her task. Likewise, potential ‘user ignorance’ with regard to ventilation was used as an argument, by the control system supplier, for more ‘intelligent’ control systems. Consequently, references to the users’ needs and behaviour occurred when it was (seemed) convenient in relation to the participants’ own predetermined preferences and sequence of arguments (not as probes to test the feasibility of their hypothesis experiment). Thus it can be said that the social process view of designing somewhat overruled the experiential view.

Regarding distortion of communication, it is also noteworthy how the engineer was trying to restrict information, when explaining the floor heating system:

\[24.45\] No. 12: An alternative would be...well no...this we think would be the most sensible thing to do and it is of course also why we have done (described) it like that...

Also, the framing of problems could be used to transfer responsibility, as when the design architect, who was under pressure for providing façade drawings, drew attention to the constraints associated with standard sizes of windows. No. 7 built identity by reference to her exclusive expertise (we need also to consider aesthetics) and framed the problem: ‘standard sizes of windows’. Again, it is not to say what she was thinking and whether it was a conscious act, but it worked in her favour.

**The value of asking questions**

Within the context of persuasive schemes and attempts to control information, the second meeting illustrated the value of asking questions; No. 9 was particularly good at this and it resulted in a lot of additional information with regard to the grounds for ‘rightsizing’ the floor heating system and the financial conditions surrounding the project.
This corresponds with Bales’ finding that people with an accepted low status (or very high status) are more likely to ask (potentially ‘stupid’) questions within a competitive environment (see theory chapter 4.3):

[1:16:18] No. 9: Yes, but can I just ask a maybe stupid question…wasn’t there something about… in the beginning…that all the money hasn’t been raised yet…?

Stubborn questioning could also be a way to offset expert language as when the architect (No. 1) in the second meeting asked whether a wire would become visible. Here the discussion (as apparent from the rest of the transcript [April 23rd, 2009, 45.33]) was settled when the technician finally pointed at a sensor device on the wall and said that it would look like that and no cable was visible. This furthermore exemplifies the use of visualisation to aid communication and reach mutual understanding (de-codification).

However, as mentioned earlier, persuasion is not necessarily a bad thing. The individual participants’ preferences may have been based on what they believed was best for the client and stakeholders in general. Also, the client was present in the meetings and he could therefore take part in the discussion and ask questions if it was perceived to be necessary. The question is whether he was capable of seeing through the rhetoric, implicit interests and codified language?

Interpretations inspired by postmodernism

The attention to rhetorical schemes provided in the above analysis is somewhat in alignment with the postmodern emphasis on the constitutive power of language. A postmodernist would, however, not see the rhetoric as conscious, manipulative acts of the participants, struggling for dominance. The discussions should be seen as local clashes of discourses. Through education and assimilation in his company, the design engineer may have been taught that mechanical ventilation should be incorporated. Likewise, the employees from the CS-Group cannot help speaking of windows, and consequently natural ventilation, since this is what their company is most famous for, although they also sell mechanical ventilation. The latter is not to the same extent part of their identity. Likewise, the architects cannot help defending aesthetic aspects – otherwise they would not comply with their role as architects. Each participant has been granted a somewhat stereotypical role, by the other participants, which they reproduce, although the roles may shift slightly from time to time.

Accordingly, as described above, the project team leader and the client were very passive in the first meeting, when it was dominated by the CS-group, but became more and
more active in the second meeting and third meeting. The roles they had been granted, by the social structures, had changed. Likewise, if one perceives the participants as ‘puppets’ of societal structures and norms, one cannot ‘blame’ the participants in the third meeting that they were looking for a good bargain – this is an integral part of how the construction industry works.

Accordingly, what was earlier described as a ‘struggle over dominance’ may essentially be seen as an affect of institutionalized role-frames. Although it had been decided to adopt partnering the design engineer may have clung to his traditional role as leader of (the technical) design. In addition, the participants in the third meeting saw the supplier’s involvement as purely business and they are likely to have interpreted any recommendation coming from the supplier within this perspective – hence the scepticism. Although established role-frames may ease group problem-solving (see theory chapter 4.3) it may also constrain the participants from seeing beyond the role-frames and, in this case, hinder collaboration. As noted in the chapter on communication (chapter 4.3); a person’s perception of a given situation is biased by preconceived expectations and past experience (Boyd & Chinyio, 2006). However, subsequently the supplier has confirmed to the researcher, that their suggestions – especially in relation to the daylight analysis – were in fact taken seriously and resulted in design improvements (change in window configuration). Their suggestions were not merely rejected as attempts of marketing.

Drawing on the idea of a power-knowledge connection, one may add another facet to the above interpretation. Thus technical codified language provided a power imbalance. Within the first two meetings the vast majority of technical experts made ‘sustainability’ into a matter of engineering. The architects became reliant on the technical experts, who could represent whatever technology in accordance with any normative design discipline. From a postmodern consideration of ‘identity’, one could argue (as in the first and third case-study) that the identity of the architects was challenged within this ‘integrative’ setting; from a traditional leading position (within conceptual design) to a ‘guardian of architectural values’ (aesthetic, simplicity etc). An obvious example of this was provided when the architect, in the second meeting, argued for ‘simplicity’ as opposed to ‘complicated’ technology (a term that had been carried over from the first meeting). Here the design engineer argued that this was actually what they were doing – providing simplicity by integrating all the various systems. The architects had no way of opposing this. Also, the client representative’s passivity may likewise be a consequence of limited technical knowledge, which made him incapable of contributing or assessing what was going on. On the other hand, it did not seem as if the ‘lay-people’ completely resigned. The architects to some extent made resistance by rejecting technology as valuable in itself and drew attention to the virtue of aesthetics and user autonomy in relation to ‘intelligent’ control systems. The client reacted when he sensed uncertainty among
the ‘experts’ regarding the integration of monitoring data – the project was not going to pay for this uncertainty and any potential development cost.

Accordingly, one should be careful not to grant rhetoric omnipotence. The different participants, in a setting like this, are likely to interpret the arguments differently or they may not even pay attention – possibly some of them had already made up their mind, but continued the discussion to comply with the democratic norm and maintain social status. In addition, the discussion may work as a ‘brain-storm’ for creating the sufficient retrospective arguments to legitimize the decision. Accordingly, the mechanical (hybrid) ventilation was maintained by the engineering consultant in the second meeting, although he was under a lot of pressure to change it in the first. Had he not engaged in the discussion in the first meeting, but merely rejected the proposition to use natural ventilation without any argument, he would have seemed arrogant and his status would consequently suffer. As Bales (1999) point out, participants in group interaction pay as much attention to self-identity as solving the task at hand (see theory chapter 4.3).

Within the postmodern perspective, one may again consider whether the notion of client value makes sense. Judging from the present data the design process really seems random. Of course we cannot know what exactly happened before, in between and after the meetings. Nevertheless, within the meetings various arguments and possible solution were brought up as the participants came to think of them. Some of them were ignored, some were accepted (although they may have been interpreted differently), and some were changed in the subsequent meeting, when other participants discussed the same matter.

The handle for the water tap may have been rejected for not being a Danish product, but then again, it may have been accepted for being Scandinavian. It could also be that it was rejected for not looking sustainable or any other reason, which the parties in the local situation could come to think of. In addition, as argued above, the outcome may not depend on any of this, although the arguments would be used retrospectively. Did the client really care? Maybe if the tap handle was sponsored by some company, who adopted the narrative about publicity. What if the design engineer had not thought of the handle?

Of course the tap handle is a very small, rather insignificant part of the design, which may in fact be a random chance selection. Other parts of the design may be generated through the overall design idea or narrative constructed for this particular project – a narrative which, however, is in a constant flux because of fleeting interpretations. Furthermore some decisions are likely to be heavily influenced by norms (e.g. doors are squares and hinged on the side). When bringing all these different ‘factors’ together, the
idea of client value, as something discrete that may guide the design as a North Star, seems naïve.

6.4.5 Summary
The case-study is an example of how complex design can be, although the project is relatively small. It is suggested, via the hermeneutic perspective, that the data shows exhibits of the conversation view of designing in which problem framing as well as naming of design elements and associated design disciplines seems evident. The design disciplines were not predetermined, but seemed to emerge in a rather unstructured manner as the participants came to think of them and as they were deemed relevant in the assessment of alternatives. It was suggested that perceptions of value were displayed in the priority of these disciplines (comfort, low-cost, appearance). More explicitly the participants also, in a few instances, expressed a personal judgement of specific solutions. Only a few considerations were made regarding client and user value.

It was furthermore argued that the participants somewhat ended up in a state of paralysis when simultaneously trying to integrate all types of interlinked considerations regarding daylight, appearance, indoor climate, function and monitoring. Here four strategies were identified, which the participants more or less explicitly used to move on:

1. Transfer the task of ‘integration’ to one particular participant or sub-group
2. Abstract and isolate problems that can be addressed in other (logically ordered) meetings
3. Reduce the unknowns by consciously omitting certain aspects of the problem
4. Name and prioritize design disciplines to help decision-making

The critical theory inspired interpretation drew attention to power-structures and domination through participant majority. In addition, examples of apparent use of rhetoric were highlighted and it was argued that selective and tactical naming of design disciplines (simplicity, arrangement flexibility) may be used instrumentally in promoting a (personally) preferred solution. Thus, the social process perspective of designing came into play. Furthermore it was highlighted that questioning may work as a countermeasure against distorted information/communication.

Finally the postmodern perspective was used to reflect on the possibility of deterministic role-frames working through the actors (as opposed to conscious manipulating subjects). In addition, the knowledge-power connection was highlighted, which in this project was a challenge to the architects and client representative who apparently did not posses the technical knowledge that the engineers and technicians did. In addition, the postmodern perspective warned against granting rhetoric omnipotence and highlighted
the various ‘factors’ that may influence design: norms, local narratives and random chance selection (as opposed to strategic choice).

The findings and mores specific answers to the research questions are listed in table 6.4.4.2 below.

<table>
<thead>
<tr>
<th>Research questions</th>
<th>Hermeneutics</th>
<th>Critical theory</th>
<th>Postmodernism</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do the client and other project stakeholders’ value perceptions manifest? (RQ 1)</td>
<td>• Explicitly through evaluation of design suggestions</td>
<td>• Implicitly via priority and tactical, selective naming of design disciplines</td>
<td>• Through deterministic role-frames</td>
</tr>
<tr>
<td></td>
<td>• Implicitly via priority and naming of design disciplines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What issues can be identified in conceptual construction project design-processes in relation to management of client value creation? (RQ 2)</td>
<td>• Paralysis because of nested tasks and inclusion of many participants</td>
<td>• Rhetorical manipulation</td>
<td>• Knowledge-power imbalance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Selective presentation of information</td>
<td>• Design as a mix of norms, local narratives and random chance selection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Struggle over dominance (power)</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.4.4.2: Summary of case-study interpretations

After reviewing the first draft of the analysis, No. 5 made the following comment:

*No. 5: I could recommend that you tried to elicit some of the good results as well. For example, we worked a lot in between meetings and the daylight calculations were an advantage to the project. Through dialog, we also changed the space distribution; the technical room was moved so it did not collide with the sloped walls. I think the dialog meetings created a lot of value, but I also agree that they sometimes could seem chaotic.*

*In addition, I would like to mention that we worked on thermal solar-heating.*

*I like your comment about reaching a common understanding and a shared picture before discussing partial solutions. I think that this is a general challenge for the industry.*

*(Author’s translation)*

Given the somewhat critical analysis where the CS-group chief representative and the chief design engineer played key roles, it is particularly noteworthy that these to participants subsequently approved the analysis.
7 Synthesis

The four cases presented in the previous chapter are different in size, development-phase, management approach, organization etc. In addition, the type and extent of data is different and the methodology is used to ‘open up’ for multiple interpretations. This imposes various challenges. One of them is to make it all converge into a few general conclusions – which most researchers and readers prefer. This is the objective of the present chapter. Thus the chapter draws on all previous chapters and provides answers to all three research questions. This leads to the conclusions of the thesis. Further introduction to the content and structure of the chapter will follow. The overall positioning within the research design is illustrated in the figure below.
7.1 Introduction

Within this chapter the research questions are used in order to impose an analytical structure across cases and meta-theoretical perspectives. This is possible because all cases, nonetheless, are similar in that they are construction projects, which have been observed in (different parts of) the design phase. The idea is, that the diversity, in almost all other aspects, can become an advantage in that it either provides different answers to the same questions, which may be used for dialectic reasoning to deepen the analysis, or it may provide similar answers, which makes the answer even stronger in that similarity is found in spite of the various differences. The synthesis is structured as follows:

- Discussion of research question 1: How did perceptions of value manifest in the four case-studies?
- Discussion of research question 2: What are the main issues identified in the four case studies, in relation to client value creation?
- Implication of item 1 and 2: A vector model of influences on value creation
- Design management concepts revisited – shortcomings and solutions
- Discussion of research question 3: Guidelines for management of value/values
- Critical reflections on results and recommendations

First, however, as part of the introduction, it seems appropriate to ensure that the reader understands how the author thinks of and distinguishes between the central notions of value, values, organizational values, process value, quality and qualities. Fundamentally, the case-studies have not given raise to alter the theoretical derived definitions and distinctions provided in chapter 4.1. Therefore, on the basis of the argumentation provided earlier, the following terminology (operational meaning) is used henceforth:

<table>
<thead>
<tr>
<th>Central notions</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>A subjective judgment (e.g. of a solution/product), which is likely to be structured by needs, purposes, values and situational factors (e.g. scarcity, time, frame of reference, group pressure)</td>
</tr>
<tr>
<td>Values</td>
<td>The individuals core ideals – the ends by which he assesses the appropriateness of his desires. Values are likely to be structured by professional and cultural values. Values are likely to change at a slower pace than value judgements</td>
</tr>
<tr>
<td>Organizational values</td>
<td>Code-of-conduct agreed between a number of individuals (with differing values), which is likely to be structured by the group members values, purposes and norms</td>
</tr>
<tr>
<td>Process value:</td>
<td>The gratifying experience attained within a process/activity</td>
</tr>
<tr>
<td>Quality:</td>
<td>The objective fulfilment of pre-scribed qualities</td>
</tr>
<tr>
<td>Qualities:</td>
<td>Grounds for evaluation, which have been chosen on the basis of needs, purposes, values and situational factors (e.g. resources)</td>
</tr>
</tbody>
</table>
### 7.2 Research question 1: How did perceptions of value manifest?

The first case-study, in which the workshop model was applied, showed that although the design had been developed to a rather detailed level and workshops had been held before, new substantial changes were spurred, when reflecting on client “product values” (qualities) in the second go-around. The client’s perception of value was manifested in explicit discussions of priorities (sustainability/user functionality vs. aesthetics) and in subsequent design-changes (ventilation system with heat-recovery, yellow facing brick etc.).

Furthermore, when discussing the effect of the workshop model and the changes which had occurred, the architects and the contractor representative expressed value-priorities, which seemed stereotypical for their profession: the architects were speaking about coherence and aesthetics, while the contractor representative was speaking about buildability and cost. However, both parties also emphasized that their objective was to create a building that satisfied the client and end-users. How did their perceptions of value manifest? Among other things, the architects promoted (unsuccessfully) the need to maintain the expression of the preceding buildings, which included the expensive facing brick. Accordingly, they regretted that they had ended up with a cheaper brick and saw-dust wall paper. Likewise the landscape architect had, according to himself, fought fiercely for the original flag-stone as well as the trees and plants in the gardens. Thus, the consultants and contractors made value-laden attempts of influencing the design. Thus a tentative conclusion would be that their perceptions of value manifested in their argumentation for design solutions. Furthermore it seemed that their perceptions of value were heavily structured by their profession (role-frame) and associated values. Or, depending on ontology, their perception of value manifested through the ‘chosen’ role-frame/profession.

In the second case-study, the University office and nursery building, this became more apparent. Here the architects were leading the process and their perception of value was rather obvious in the discussion of design solutions (e.g. cell-offices, shape of the roof, façade-brick). On the other hand, some design-discussion did not seem to include value judgements – it was more a matter of problem-solving (e.g. height of basement, ways to...
incorporate the district heating station). This lead to a proposal of two types of design conversations:

- Type-1 conversation concerning the exploration and integrating of various technical and architectural aspects of the design.
- Type-2 conversation (or frame-negotiation) about framing and priority of design disciplines/qualities

It was suggested that Type-1 conversations were nested within Type-2 conversation, where the latter set the stage for the former. Using the terminology of the experiential learning view of designing, the Type-2 conversation involved frame negotiation (e.g. can the shape of the roof be changed or should savings be found in other places?), which was to a greater extent influenced by (differing) perceptions of value (priority of qualities for evaluation) than the Type-1 conversation (looking for savings in other places). The client and users’ perceptions of value also seemed to manifest in the discussions (conversations) over alternatives and through concrete requests. Thus, although no specific discussion of value was conducted (within the meetings observed), it seemed clear to the researcher that preferences were displayed indirectly through the suggestions, questioning and defence of solutions in the conversations and case documents. Basically the architects were defending the architectural expression and coherence, while the engineering consultant was partly questioning whether this was necessary and argued for structural concerns. The users focused on everyday functionality and the client was concerned with viability.

An analogy can be made to Hodges & Baron (1992) who describe negotiations as values-realizing events (see chapter 4.1). However, it should be noted that these concerns and preferences are not only structured by values, but also (according to the above terminology derived from chapter 4.1) the needs and purposes of the different actors and organizations (e.g. earning money). However, critical theory questioned whether the preferences were appropriately balanced and pointed at distortion of communication as a manifestation of (differing) perceptions of value. This will be further addressed in the section concerning ‘issues’ in relation to client value creation.

In the case-study of the California hospital, the first part of the study aimed to map reasons for making design changes, based on the pre-understanding that (changing) perceptions of value would be reflected in the design changes. This study showed that most changes were derived from the designers’ refinement of assumptions. This aligns with the notion of Type-1 conversations where design development happens through the exploration and learning of conditions, possibilities and meaning. Thus a concrete example would be the steam-boilers, which were changed from 9 small boilers to 2 large
boilers after the designers had learned that the user-organisation was certified to handle large boilers. Another example would be the freight elevators that were changed, when the functionalities of the floors, they were serving, had been clarified. These changes were sensible – there is no need to theorize any further.

On the other hand, this may be interpreted as instances of ‘correction’ of misinformation. However, given the extent of ‘relevant’ information, such an interpretation would rest on a positivistic, rational assumption that all relevant information can be indentified initially and stated in a clear problem-description – something that research on briefing (chapter 5.2), designing (chapter 4.2) and communication (chapter 4.3) seriously chal-

It is also noticeable that the client’s focus on cost was apparent in the statistics as main criteria for approval. Accordingly, the study did not show many occurrences of changes that were derived from a change in the client’s perception of value (priority of grounds for evaluation). However, a lot of extra wishes had been accumulated on an ‘added-value item list’ and the consultants were frustrated about the users who, apparently, were constantly changing their minds. Thus it seemed that at least the users changed their perception of what was valuable, which spurred requests for design changes. In relation to this, it is, however, important to notice that the changes in requirements or uncertainty with regard to e.g. hospital equipment derived from (expected) changes in technology. Thus, some of the changes in perceptions of value are likely to derive from changes in circumstances (e.g. the market, the cost estimate, technology) and an evolving understanding of the end-product. This relates to the conversation view of designing (chapter 4.2) and the Kano model described in chapter 4.1 where ‘delighters’ become ‘basic characteristics’ over time. If this is true, the changes could not have been ‘avoided’ with an initial statement of values or preferred qualities.

Some struggles over cost and functionality had also occurred between the client and user-organisation. Thus, if the designers viewed these stakeholders as a joint ‘client’, then it would seem that changes in perception of value had occurred, and consequently that these changes had manifested in design-changes.

The negotiations between the user-organization and the owner can also be viewed as Type-2 conversations. Thus, the case-study equally supported the tentative conclusion that perceptions of value manifest in the arguing over design alternatives. Again it was quite stereotypical how the architects, with help from the city-architect, were successful in ‘helping’ the client to see the ‘bigger picture’; the pre-cast concrete façade was not feasible from an aesthetic perspective. In opposition to this, the general contractor was pushing for cost-savings. Some of the interviewees were very honest about this ‘nego-
tiation’ of preferences between architects, engineers and contractor representatives. Again it seemed that the stereotypical values associated with the different professions, to a great extent structured the participants’ perceptions of value.

In the fourth case, the low-energy university guest houses, it was possible via video recordings to observe group behaviour at a very detailed level. The first meeting in particular showed the relevance of the conversation view of design (or experiential learning), where the problem framing changed during the meeting (from “space for ventilation ducts” to “overall ventilation principle”) and various design elements and associated disciplines were named by the actors as ‘characters’ in the problem-solving effort, but also as arguments in frame-negotiation.

Thus the frame-negotiation about ventilation revealed that some actors had clear preferences, which were manifested in their recurring naming of disciplines in favour of their preferred solution. However, it is impossible to know why the participants were arguing for different solutions (unfortunately no interviews were conducted). Was it because of convenience, cost of re-design or habit or was it their values that structured their preferences? However, seen in connection to the other data, where the architect argued for aesthetics (handle for water tap, not too many lead-ins, no visible wires), and the engineer for example stated that touch panels were ‘fun’ and was pushing for technology, it appeared that the actors had adopted the traditional values associated with their profession and found arguments that aligned with these. Consequently, it seems reasonable to suggest that values somewhat guide our perception of value, and perceptions of value are likely to manifest in the problem framing and naming of design elements (and associated disciplines). Accordingly, some of the disciplines that were suggested could in themselves be understood as values (simplicity, beauty, low-energy consumption, etc.)

Looking at all four case-studies the researcher therefore concludes:

<table>
<thead>
<tr>
<th>Research question 1: How do the client and other project stakeholders’ perceptions of value manifest in conceptual construction project design-processes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project participants’ perceptions of value are likely to manifest in the argumentation for and against design solutions and in any project documents that may form the basis for decision-making, particularly in frame-negotiations (Type-2 conversations).</td>
</tr>
</tbody>
</table>

| Depending on ontology, the participants’ perceptions of value seem heavily structured by – or manifest through – their professional role-frames. Their perceptions of value are likewise greatly affected by situational circumstances – not only values, which seem relatively robust. |
7.2.1 Implications
One important implication is that value management is not only a question of providing a clear understanding or consensus about client values (e.g. via a value-tree) and mechanisms that can ‘translate’ these abstract ideals into design solutions. Assessment of value depends not only on values, but needs purpose and situational factors. The importance of distinguishing between value and values is evident.

Furthermore, if one instead (more productively) thinks of the value-tree as a container of relevant qualities or grounds for evaluations, it should be acknowledged that consultants and contractors are not mere problem-solvers or servants to the client; they are people with opinions who sometimes make an effort to influence the design to their own liking.

This is not necessarily a problem from a client’s perspective. Thus in the role-frame of advisors to the client, the consultants and contractors may genuinely believe (and be right about) that their perception of how things should be done will add value to the project – also from the perspective of the client.

In addition, a clear understanding, of the client’s values, needs and/or grounds for evaluation (at a specific point in time), is not likely to restrain (costly) iterations in the design process. Not because values change – in the case-studies they seemed very solid – but because design is an ongoing conversation that includes elements of learning (about opportunities and consequences) and negotiation, which is effected by the people (and professions) who participate in the local discussions. Thus preferences (value-judgements) may change as meanings change and compromises are needed in a social process. This somewhat aligns with the findings of Bales (1999) (see chapter 4.1).

Further implications will come out of the next section, which is a discussion of the second research question.

7.3 Research question 2: What issues were identified?
The first case, where the workshop model was applied, appeared to be very successful from the perspective of the client. Both the client and user-representatives were very satisfied with the project and the workshop process in particular. However, some issues were identified seen from the perspective of the consultants and contractors and since a more wide-spread application of the concept depends on the support of these actors, the issues are relevant to consider.
The more trivial issues revolved around the time and resources spent in the three long sessions. However, this seems partly to be a matter of miscalculation as the participants should have incorporated this in their estimates. Nonetheless, especially the architects pointed at the introductory ‘lecture’ on value and values as unnecessary. Also the contractor thought it was a bit abstract. However, when digging deeper into the interview statements this revealed another less trivial issue; the architects were somewhat estranged towards the rationality applied. This was, fundamentally, not their way of working as ‘artists’ – they were more solution-oriented (cf. theory chapter 4.2). In addition, there were indications of them feeling reviewed by the external consultant. Finally, they described the workshop model as a way to legitimize a rather conformist building. Thus, a problem could be that the client ends up in a state of ‘hyper-reality’ where he truly believes that the product is of high value, whereas it seems rather conform from the society’s point of view.

A more down to earth issue was identified by the facility manager. He found it hard to keep up with the codified language that was sometimes used in the workshops. In connection to this, the landscape architect described how the consultants aimed to control the information presented in the meetings. These are communication issues, which points at the uncertainty associated with the grounds for decision-making: Had the consultants and contractor been completely open about the constraints and possibilities? Did the client representatives understand what they said? Finally, the landscape architect was rather critical towards the whole idea of partnering and the notion of “process values”. In his experience “process values” (organizational values) only worked until money became a problem – this then became the overriding concern, which could easily set aside the good intentions. Thus the workshop model could be viewed as a play to the gallery. On the other hand, when the landscape architect was under pressure to lower the cost at the expense of quality, he used his connection to the client – a relationship that had been established in the workshops. Thus, to this end the workshop model worked.

The second case-study, the University office and nursery building, to a greater extent showed how communication is not just a matter of conveying information; it can be value-laden and intentional distorted. Again this may not be a problem in relation to client value creation, as experienced and knowledgeable consultants, for the sake of the schedule (or simply because they ‘know better’), may be tactical in their presentations and communication in order to drive the project forward.

However, the case indicated that at least the architects had fallen in love with their own design before boundary conditions (the budget) had been settled. They were not open to confront their own darlings, although this might have been in the best interest of the
users (who were more concerned with functionalities than architectural expression). The critical theory perspective would go even further and perceive the situation as a case of intentional lobbyism and misuse of professional authority (by stating that no lesser design will be approved by the authorities). However, the postmodern perspective pointed at the espoused concern regarding credibility and the possibility that everybody acted on best intentions, but they (at least the architects) had ended up in a state of hyper-reality in which they granted their own instinctive omnipotence and reproduced the narrative that the ‘full package’ was what everybody wanted – it was just a matter of negotiation and politics.

The third case, where lean was the overriding management philosophy, appeared to be a success from the point of view of the client. Thus, the client and user representatives repeatedly praised the designers and contractors for their efforts. Also, the participants seemed in general very enthused about the concept. However, when digging a bit deeper, several issues were identified. Again potential distortion of communication was highlighted in attempts of persuasion through selective presentation of advantages and possible solutions. Also, as found in the first case-study, there appeared to be a clash of design rationalities, as the engineering piece-meal (value-engineering and TVD) approach did not align with the rationality of some of the architects. Coherence might be lost within this approach and some of the designers started to become exhausted by the ongoing review process. There also seemed to be a risk of dogmatism regarding ‘right-sizing’ that clouded the participants view in relation to long-term flexibility and adaptability (cf. chapter 5.2). In addition, tension was found between the classic roles of the architect and contractor. Finally, although the TVD-chart seemed to ‘work’ in a positive way as a tool of sensemaking (and undisputable optimizations were in fact achieved), it ironically showed how the target was increasing, while the participants celebrated the savings.

The fourth case-study, concerning the low-energy university guest houses, illustrated the iterative nature of designing. The participants seemed almost paralyzed by the interdependence of design elements and the many concerns they were trying to address simultaneously. It furthermore showed how different strategies were more or less consciously adopted to move forward. These included:

1. Transfer the task of ‘integration’ to one particular participant or sub-group
2. Abstract and isolate problems that can be addressed in other (logically ordered) meetings
3. Reduce the unknowns by consciously omitting certain aspects of the problem
4. Name and prioritize design disciplines to help decision-making

These different strategies may theoretically involve various pitfalls in relation to client value creation. However, the case-study ended too soon to observe the real consequences. Nonetheless it could be observed how item 1 was pushed forth and back between participants as they tried to avoid the coordination task. In relation to item 4, it could be observed how the participants seemed to name and prioritize design disciplines subjectively in accordance with their preferred solutions. Accordingly, rhetoric and persuasion seemed to be an integrative part of design development although the impact of this was hard to determine. Furthermore, the case-study showed how the presence and absence of a single stakeholder may influence the meetings to a great extent. There were indications of a struggle over dominance and the postmodern perspective also pointed at the power-imbalance associated with different degrees of technical knowledge. Accordingly, this study pointed at the potential randomness of design decisions in a social process.

When looked at concurrently, a couple of themes emerge as they were repeated in all or most of the case-studies:

<table>
<thead>
<tr>
<th>Research question 2: What issues can be identified in conceptual construction project design-processes in relation to management of client value creation?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Distortion of communication as a result of:</td>
</tr>
<tr>
<td>a. Value-laden attempts of persuasion (Case 1, 2, 3, 4),</td>
</tr>
<tr>
<td>Including selective presentation of information (Case 2, 3, 4)</td>
</tr>
<tr>
<td>b. Knowledge imbalance/codified language (Case 1, 2, 4)</td>
</tr>
<tr>
<td>c. Power structures (Case 1, 2, 3, 4)</td>
</tr>
<tr>
<td>2. Architects estrangement towards (engineering) management rationality (Case 1 &amp; 3)</td>
</tr>
<tr>
<td>3. Hyper reality and/or un-reflected dogmatism (Case (1), 2, 3)</td>
</tr>
</tbody>
</table>

7.4 Implications

Item 1 and 2 above can be seen as a consequence of the answer to research question 1, in that different professions and perceptions of value are at stake in construction projects. Item 2 also aligns with a description made by Emmitt (1999) about architects’ general attitude towards ‘management’. However, having stressed the suitability of the experiential learning view of design, item 1 highlight the relevance of a competing-supplementary perspective: the social process view of designing (cf. chapter 4.2). This aligns with the findings of Cross & Cross (1995) and Sebastian (2005) who emphasize the aspect of group dynamics in design teams.
In relation to item 3, it could be argued that this is somewhat speculative – especially in relation to the first case-study. However, the author does believe that there is support in the data of mild states of hyper-reality and dogmatism; where the participants created narratives in their local setting, which somewhat clouded their minds from critically assessing their conduct.

Again the implication is that there is a lot more to consider – when aiming to manage value – than the creation of a good brief or an initial round of value management workshops to establish the value-tree and subsequent auditing of solutions. Informal, emergent interaction structures matters (cf. chapter 4.3).

It is particularly noteworthy, that although attempts of value management were performed in both the first and the third case-study, the above issues could still be identified. Thus, although a clear perception of client needs and preferred qualities may have been established through Value Management (the social housing project) or Value Engineering sessions (the hospital project), it is not likely that people are simply going to set aside their own perception of value in pursuit of client value creation. When performing an audit, they may, however, pretend that a value tree has been used in decision making (as in the social housing case). Thus, rhetoric, codified language and selective choosing of information can distort any auditing situation. In addition, there are so many decisions to be taken that a value-tree cannot provide guidance to all of them (consider the discussion in the first meeting of the low-energy guest house project).

Again this may be a good thing as different views may challenge and expand the client’s frame of reference. It can also be argued that soft-system value management ‘only’ strives for consensus – not optimization. Nonetheless, it is certainly a problem, if design becomes a matter of rhetoric and power.

However, to ensure ‘decent behaviour’ partnering and particularly Values-based Management proposes the establishment of shared organizational values. Yet if one considers the hospital case, where lots of resources were spent on advocating ‘citizenship’ to the project; the designers were still trying to influence the design to their own liking. Furthermore, if we are to believe the landscape architect in the social housing project, he was bullied in spite of the discussion of “process values” (organizational values) – cost were more important. This is not to say that all these concepts and techniques should not be applied, it is just to point at their limitations, which is something that will be further addressed below. For now, the implications can be summarized in the following sentence:
Value is actively created in the selective choosing, comprehension of and argument over relevant solutions in the local context.

Client value creation is, therefore, unlikely to be ‘controlled’ via auditing against written statements of preferred qualities or overall organizational values.

Regarding persuasion and unilateral behaviour, it is however relevant to remember what was described in the theory chapter on communication and group dynamics theory; that research has shown that professionals tend to stick to their line of expertise (Emmitt & Gorse, 2007) and attention, in group problem-solving, is linked as much to self-identity as the task at hand (Bales, 1999). Accordingly, the apparent attempts to influence the design may be understood as a matter of building self-identity; the actors contribute in the areas where they feel confident and thereby gain recognition and avoid insecurity. Thus, when the architect places emphasis on aesthetics and the engineer insist on mechanical ventilation, it may not be a matter of achieving architectural glory or avoiding cost for rework, but a matter of personal (in-)security.

Before answering research question 3, a ‘vector model of influences on value creation’ will be presented. The model should be seen as an attempt to synthesize and illustrate the complexity of influences on value creation, which have been identified so far. Together with the above statements, the model provides the foundation for answering research question 3.

7.5 A vector model of influences on value creation

If one considers a simple discrete part of a design task (e.g. the design of a staircase in a building), then the result will, according to Schön (1991), be affected by at least four constants (cf. chapter 4.2); these are the (1) media (use of drawings or spreadsheets), languages and repertories to describe reality, (2) the designers appreciative system (values), his (3) overarching theories (e.g. knowledge of structures and/or architecture) and (4) role-frame (e.g. am I an artist, a problem-solver or businessman). Whereas the three latter constants have been described above, notice how the first constant was an issue in the second case-study; where the architects felt that a mere spreadsheet calculation would be insufficient as a basis for decision-making.

However, there are more influences: if the designer has designed a lot of staircases before, the solution may also be affected by habit (knowing-in-practice) – especially if he is in a hurry. Although this is somewhat included in the first constant (‘repertories’), it
is highlighted here as a separate influence. Furthermore, the staircase cannot be seen in isolation but is affected by various ‘disciplines’ (meaning a rule or binding) imposed by other design elements (floor height, landing etc.), preferred qualities (structured by needs, values etc. e.g. safety, sustainability) and outside constraints such as cost. Also, the design is dependent on the information (assumptions) available to the designer.

Accordingly, if one for the moment leaves out the role-frame and the values; the influences on the solution can be depicted as:

![Diagram](image)

*Figure 7.3.1a: Influences on the development of a partial design solution*

If the design is to be developed in a group of people, the above findings suggests at least two other constants (which are not constant in time): Power and Rhetoric.

![Diagram](image)

*Figure 7.3.1b: Influences on the development of a partial design solution*

Now one can add the systems of values of the designers and contractors, which for the sake of simplicity, only include two persons. Their values are likely to be structured at least by their profession and the role-frame within the specific context:
Finally, one may include the client and, as far as some values coincide, speak of common project organisational values (see figure 7.3.1d below).

However, other constants could probably be thought of (e.g. culture, history) and so extra ‘constants’ should be added. Accordingly, the objective is not to provide an ex-
haustive model of all possible influences on design development, but to outline the complexity in design decision making.

Thus, one might further add, that the ‘strength’ of the vectors are likely to change for each partial solution (windows, doors, floors etc) as they are considered at different points in time. Some solutions will be on the border of what the architect can accept whereas others will conflict with contractor values. Some solutions may not be important to the client (e.g. the colour of the walls in the garbage room) and so they become more heavily influenced by the contractor or designer. This is illustrated in the resulting figure 7.3.2 below, which is called the Vector model of Influences on Value creation. Henceforth this will be referred to as the VIV model.

Figure 7.3.2: The Vector model of Influences on Value creation (VIV model)

With the above reasoning as an outset, the design management concepts described earlier are revisited below.
7.6 Design management concepts revisited

Based on the VIV model and the answers to RQ1 and RQ2, the following five approaches to construction design management will briefly be discussed:

- Design protocols
- Briefing
- Value management and value engineering
- Values-based management
- Lean and Lean construction

The aim is to identify the possibilities and limitations of existing tools, in addressing the complexity represented in the VIV model. This provides input to answering research question 3.

Process models were described in chapter 3 and appendix 1. They address the complexity by reducing it. Thus, when considering the four strategies for reducing complexity, which were outlined in the fourth case-study, process models include at least the first three: (1) Tasks of integration are delegated to specific professions; (2) problems are abstracted and arranged in an orderly sequence, and (3) details are consciously left to be considered at later stages. In addition, stage-gates® with structured approval procedures based on performance criteria may help prioritise disciplines (strategy 4) to aid decision making. Thus process models can be useful for arranging and reducing the amount of disciplines and information to be considered. In relation to the latter, process models may work as a media for alignment of expectation regarding provision of information (examples of this was provided in the second case-study). However, as reported in Macmillan et al (2002), most process models do not attend to social aspects of teamwork (including rhetoric and power). Also, approval-gates are by nature reactive and often limited to a few revision points in the overall process. Thus, when considering all which goes on in between these gates, process protocols are likely to have only limited impact on value-creation, except forcing the potentially endless conversation to move forward (which is of course also important).

The case-study findings support the notion of dynamic briefing. Especially the social housing project and the hospital case-study demonstrated that continuous discussion and clarification of requirements lead to improvements in design. However, as with process protocols, briefing is mostly about the generation and prioritizing of information and disciplines (in the VIV model requirements are seen as disciplines). Some considerations are made in relation social aspects and group dynamics – this is especially due to
the contributions of Stuart Green. In addition, London et al (2005) highlight the importance of social and cultural capital. Green, on the other hand, is mostly concerned with pinpointing the shortcomings of ‘positivist’ management approaches and their emphasis on objectivity and optimization. Instead Green suggests greater emphasis on subjectivity and consensus. To the knowledge of the researcher, Green, or any other researcher on briefing, provides little guidance on overcoming issues of power, rhetoric and distortion of communication in general. Of course Othman et al (2004, 2005) highlight that designers may behave unitarily and thus ignore client requirements. Yet their recommendation is a more structured decision-making process with ongoing application of value and risk management. Fundamentally, this does not address the issue of rhetoric and knowledge/power imbalance.

The same arguments somewhat applies to value-management. Of course third-party ‘intervention’ by means of value-engineering review-sessions may bring light to other possibilities that had otherwise been ‘hidden’ by unilateral designers. However, in all the majority of cases, where designers have the best intentions, such review sessions may have serious side-effects in relation to trust and collaboration (cf. chapter 5.3). In addition, as highlighted before, value-engineering is reactive and seems only applicable to technical problems that can be broken down in its constitutive components and functions (Green, 1996b; chapter 5.3).

Values-based management (and partnering for that matter) is very different in the sense that it only focuses on the ‘soft’ aspects of management. However, within a short-term construction project environment, the concept seems a bit naïve. Many consultants and sub-contractors only do a small portion of work on many different projects each week. Furthermore, in support of this claim, it is especially noteworthy that political processes were apparent in the hospital case-study, although great efforts were made to ‘socialize’ participants.

Lean also includes aspects of VBM – especially in the recent years it has become popular to talk of lean as a cultural transformation (cf. chapter 5.5). In addition, lean is very concerned with clear and factual information, as well as open and serious consideration of alternatives (e.g. A3 reports, set-based design, CBA – cf. chapter 5.5). This can be seen as measures against habitual thinking and one-sided opinions. In addition, various tools and techniques are suggested for coordinating and prioritizing information and disciplines (e.g. DSM). However, the hospital case-study showed that rules and structures do not prevent subjectivity and rhetoric in decision-making.

Of course, it is probably impossible to completely avoid misuse of power and selective choosing of information and arguments. In addition, these issues should not be granted
omnipotence. Nonetheless, the existing tools and concepts for management of value seem to be wanting in this respect. This leads to research question 3, which will be addressed in the following.

7.7 Research question 3: What recommendations can be made in relation to management of client value creation?

The complexity of design development and value creation, which is attempted illustrated with the VIV model, is unlikely to be ‘tamed’ with a set of procedures like QFD, DSM etc. Inspired by the analytical framework and group dynamics theory, it is instead suggested to stimulate group reflection and self-adjustment. Thus, although critical theory at some points led the researcher to represent the case-study participants as self-centred and manipulative, they were probably behaving with the best of intentions. Most professionals certainly would like to do a good job and have a satisfied customer. They were just too busy to reflect on their conduct. However, the researcher had the luxury to sit and ponder on what was going on, with a fault-finding perspective, without being caught up in various other projects, deadlines and writing of minutes. In addition, the researcher was aided by the three analytical perspectives to ‘see’ various pitfalls in the case-studies. Thus, the perspectives were found to be difficult but also generative to the process of analysis. The initial thought was, therefore, that they could be helpful to professionals as well. However, the theories are lofty and difficult to practitioners (the researcher was a practitioner prior to this study). It is therefore suggested to crudely condense these three well respected and profound theories into three related metaphors:

1. Part-whole conversation
2. Game of persuasion
3. Hyper-reality

The first metaphor is inspired by hermeneutics and the experiential learning paradigm. The second is inspired by critical theory and the social process view of designing. The third metaphor is inspired by postmodernism and the notion of group-think. These metaphors, which will be explained further below, can work as a design management tool for thinking. Accordingly, as noted in chapter 4.3, third party observation and feedback and group reflection can change group behaviour in a more positive direction (Bales, 1999).

Thus, seeing the design process as a part-whole conversation may help participants to acknowledge and embrace the iterative nature of designing. The group or the facilitator may explicitly consider what measures can be taken to avoid paralysis (cf. case-study 4) e.g. the four strategies to reduce complexity. Also, the group may become more aware
of the implicit disciplines that are named as characters in the conversation as well as their individual framing of the problem and the precedents they may be based on. Accordingly, the participants in the guest house case-study may have found it useful to draw a diagram like the one shown in figure 6.4.4.1 (the diagram which shows the coupling of themes and disciplines named in the first design meeting). The facilitator may consider whether the conversation at some points has turned into a monolog and whether this is appropriate (cf. case-study 2). In connection to this, the facilitator may consider whether a Type-1 or a Type-2 conversation is taking place. A Type-1 conversation is about problem-solving and can be solved with engineering logic. Although ‘wickedness’ is acknowledged, it is mostly a matter of listing the agreed factors, criteria and alternatives and selecting the best solution. On the other hand, a Type-2 conversation is about frame-negotiation and alignment of differing perceptions of value. This kind of conversation may be treated as a Type-1 conversation by the participants, but it is unlikely to be resolved before consensus has been achieved about a unifying framing of the problem. Here it becomes more a matter of making preferred qualities and frames explicit and create alternative frames or ‘narratives’, which can unite the various participants understanding of the problem (e.g. consider Ryd’s (2004) finding that vague requirements opened up for individual interpretation, appreciation and joint commitment).

Seeing design as a game of persuasion may attune the facilitator or participants’ attention towards the substance and rhetorical contents of information. Although knowledge of communication and group dynamics theory is important, this also entails a facilitator with a certain level of technical knowledge (consider case-study 4). One ‘intervention’ to apply within this perspective, is to ask designers to provide quantifiable facts or explore more options. One may also use the lean construction principle of asking ‘why’ five times. However, one should be aware that this may seem provocative and more alternatives will always entail extra cost (up front). Decision support systems and matrices can also be utilized to minimise the dominance of prominent actors. In addition, the facilitator may ask the ‘stupid’ questions, which nobody else is going to ask (because of the risk of appearing incompetent). Clarifying and summarizing may be a way to overcome ‘codified’ expert language (case-study 1) and thus level the knowledge-power imbalance (case-study 4). In addition, the facilitator should be aware that decisions tend to emphasize some values over others (Bales, 1999). Consequently, by recognizing the threat of loss to some members the facilitator can proactively direct the group to explore more options that may result in ‘win-win’ solution (or at least some compensation) before individuals start to pull in individual directions (Philips & Philips, 1993).
The hyper-reality metaphor may stimulate reflection on prevalent narratives, which need to be qualified or rejected through confrontation with alternative conceptions of ‘reality’. Thus general assumptions may be tested by directly confronting for example stakeholders and their perceived agendas (case-study 2). Accordingly, as a researcher, it was fairly safe to sit and analyse the case-study transcriptions and theorize about their meaning. However, it became much more ‘binding’ when the results were sent back to the practitioners for commenting. It may also be beneficial to have serious discussion on the down-sides and limitations of lean or any other management system used (to avoid dogmatism – cf. case-study 3). Accordingly, acknowledging the constitutive effect of subjective, potentially one-sided conceptions of the world, Orlikowski (2004:92) argues for a critical reflexiveness among designers and managers, which makes them more “attentive to the implications of their choices”. This also somewhat connects to Schön & Agyris notion of 2nd order reflection and Model II thinking (Agyris, 1977; Schön, 1991). Although not entirely the same, the metaphor may also direct attention to potential group think. Thus the facilitator or the group may stop for a moment and explore individual, subdued divergences.

Thus, having learned the underlying meaning of these metaphors, a group may reflect on its endeavour or a group facilitator (as in the workshop model) may use these metaphors as a tool for thinking and intervention. Accordingly, Green (1996a) has suggested a similar approach to become aware of how clients think about their organization. It is argued that this will help the ‘brief-taker’ to speak the same language as the client as well as challenge the client representatives to achieve new insights about their organization. In addition, explicit consideration of different metaphors may help the consultant to adopt the most ‘appropriate’ metaphor to govern the briefing procedure (Green, 1996a). Accordingly, Green (1996a:158/159) states that the use of metaphors “moves the debate away from asking which organizational theory is more ‘correct’ towards which theory provides the more useful insight in a given situation”. Thus, the use of metaphors is not a novel idea. However, Green (1996a) does not see this as a means to facilitate and stimulate reflection in work-groups, which is the suggestion made here.

Within the framework, described by Green (and which draws on the work of Gareth Morgan), the Part-whole conversation metaphor is similar to what is called the ‘cybernetic’ organization metaphor. Here the organization is seen as a brain that is capable of learning from experience (and reflection). The second metaphor, game of persuasion, covers two organizational metaphors: the political metaphor and the domination metaphor. The political metaphor represents the organization as mere instrument to organizational members, who pursue their own goals. This may include the forming of tactical sub-coalitions. The domination metaphor represents critical theory and sees organizations as means for brainwash and exploitation of employees. The third metaphor, hyper-
reality, is similar to what Morgan describes as the ‘psychic prison’ metaphor which draws attention to strong organisational norms that may constrain creativity. The notion of groupthink also connects to this metaphor.

At this point the term facilitator has been used a couple of times. The notion is closer to what is understood as a ‘leader’, than that of a ‘manager’. However, as opposed to leading and steering, facilitation is more about guidance and coaching. Gottlieb (2010) makes a somewhat ironic analogy to a shepherd. In the more general management literature, the notion of a facilitator has been known since the 1960’s and initial guidance can be found in Philips & Philips (1993) and McFadzean & Nelson (1998). Nonetheless, facilitation and coaching are rather new terms in construction management literature. Thus, when searching the main topical journals for words such as facilitator, facilitation, facilitating and coaching, only a few articles appear. Certainly the literature on construction teamwork and partnering may be helpful. However, this kind of literature seems mostly concerned with collaboration as an end in itself – focus is not directed towards the complexities of design group problem-solving and decision-making. Of course value management is concerned with decision-making, but here the role of the facilitator is often confined to that of an organizer of workshops. Other related topics are group communication and group dynamics, which includes the literature described in chapter 4. However, a more holistic understanding and instrumental approach to construction design group facilitation and coaching, which is not confined to the organizing of partnering or value-management workshops, may be a promising topic for future research. This will, however, not be treated any further here.

On the other hand, the issues identified in the case-studies may be dealt with by the groups themselves. As described above, groups can adopt the metaphors themselves and reflect on their endeavour. The VIV model may also be instrumental in this respect. In addition, it seems that the very presence of a well-articulated management concept is in itself helpful. Thus, in the social housing case-study and the hospital case-study, the application of a specific management concept spurred early awareness, consideration and ongoing reflection on how to manage. Although it is somewhat speculative (considering the data basis) the very presence of a management concept may be more important than the specific guidelines of the concept. Thus a management concept may work as a ‘boundary object’ for (timely) awareness and reflection on processes and procedures. Although the guest-house project in principle had adopted the concept of partnering, it seemed only to entail early involvement of all key-actors. Lack of a more well-articulated management approach led the participants to discuss strategies for design and cost-control in an ad-hoc manner when problems arose during a meeting about

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36 Building Research & Information; Design Studies; Engineering, Construction and Architectural Management; Architectural, Engineering & Design Management; Construction Management & Economics
control-systems. Likewise, strategies for cost-control and risk management also emerged somewhat randomly in the university office-building project. Although the author supports adaptable, dynamic management, these situations seemed to be a bit too improvised. Considerations of and reflection on such fundamental matters, need a certain level of preparation and structure. It is unlikely that this would have happened in the social housing project or the hospital project – procedures had been considered and discussed from the outset.

Accordingly, the overall recommendation is not to adopt one particular management concept. The recommendation is timely awareness, establishment, explicit reflection and corrective action on processes, rules and behaviour to generate value to the client. This may be aided by an external facilitator with knowledge of communication and group dynamics theory (in addition to technical knowledge). Also, the VIV model and the three metaphors have been suggested as instrumental tools to aid reflection. In the following, more specific recommendations will be made in relation to the workshop model.

7.7.1 The workshop model revisited
When considering the initially described workshop model process, which formed the outset of the research project, a number of recommendations can be made. Many of these recommendations will, however, apply to similar value-management concepts. However, before continuing with very concrete suggestions, a few overall considerations are made.

Starting from the methodology chapter and throughout the entire thesis, words such as reflexiveness, post-traditional, reflection, learning, change, ambiguity, flexibility and iteration have dominated the text. Thus, in line with a current trend to move away from a traditional “plan then execute” paradigm in project management (Leybourne, 2009); the author will propose a more adaptive framework. Corresponding to the conversation view of designing, it is suggested to highlight the iterative, learning perspective. Accordingly, all case-studies were exposed to uncertainty and change. Although change was encouraged in the hospital case-study, the TVD chart in chapter 6.3 is illustrative of the experiential learning perspective – initial assumptions were made, tested and changed as new meanings arouse.

Of course, this perspective is already somewhat embedded in the workshop model concept. Thus, the inventors highlight that more than one workshop is sometimes needed within each ‘workshop category’ until consensus has been achieved. They acknowledge that no optimal answers exist, that the client’s frame of reference may be limited and
that design problems can be ‘wicked’. Nonetheless it is fundamentally a problem-solving rationality that underlies the concept. It is a matter of sequentially (1) helping the client to become aware of his (pre-determined) values and vision; (2) develop solutions according to this and (3) evaluate against vision and boundary conditions. It is recommended to ‘soften’ this rationality and especially change the meaning of the value-tree. In connection to this, the interface between the workshop model and briefing/architectural programming is discussed and clarified.

Thirdly, all case-studies highlighted the relevance of the social process view of designing. Distortion of communication and persuasion seem to be an integrated part of ‘collaborative’ designing. This gives raise to additional recommendations.

Lastly, the suggestions are summarized and illustrated in a new flow-chart of the workshop model. This is mapped on to the overall phase-model described in chapter 3. First, however, some suggestions are made regarding the terminology applied.

**Adjust terminology**

In the view of what was described in theory chapter on value (chapter 4.1.), it is recommended to use the notion ‘organizational values’ instead of ‘process values’. The argument is that process value (not plural) has to do with the gratifying experience of an activity or process, whereas organizational values refer to the ‘code of conduct’ agreed in a project organization. In addition, it is suggested to rename the contents of the value-tree *qualities* instead of “product-values”. ‘Qualities’ is a less lofty term and it is more correct from a theoretical point of view. Accordingly, in the theory chapter (4.1.) it was argued that *value* should be seen as a subjective judgement that is likely to depend on the levels of fulfilment of appropriate *qualities* (and the ‘synergy’ between them). The qualities have been chosen based on needs and objectives, but are also guided by the actor’s values, the situation and frame of reference (see chapter 4). Furthermore, it should be stressed that the value-tree consists of *overall* qualities for evaluation. More specific grounds or factors (in CBA terms) may be relevant in each specific decision-making situation (e.g. time). Thus, it can be argued that no universal content or structure of the value-tree exists (Green, 1996b). It is however acknowledged that in a practical context a standard agenda can be generative as a starting point.

One implication of this change in terminology – other than qualifying the concept as theoretically more ‘robust’ – is that it signals the changeability of the value-tree; qualities are not as fundamental and ‘robust’ as values. If the contents of the value-tree are fixed, there is a risk of ‘only’ achieving quality – not value. As argued in the theory chapter, the difference between value and quality is the situational/contextual appropri-
ateness of the fulfilment of qualities. This is therefore a rather significant change of words. In addition, the influence of other “drivers” than values, such as needs and purposes, are also acknowledged. This connects to the recommendations provided below.

**Acknowledge the experiential learning view of designing**

The author interprets the original intent of the workshop model as, primarily, a tool to ‘educate’ consultants and contractors about the client’s preferred qualities and ensure that the professionals keep focused towards this end by means of the value-tree (although mutual sharing of “values” is highlighted in Emmitt et al, 2004, 2005). However, based on the case-study analyses, it is, as described earlier, unlikely that any overall statements of qualities and organizational values is able to proactively ‘control’ the designers or that any audit can ensure ‘compliance’ (it may only result in add-on explanations – designers are not going to set aside their own preferences). Instead it is suggested that more emphasis should be placed on ‘educating’ the client/users and enable the client-conglomerate to make decisions in the context of uncertainty.

It is suggested that the value-tree should be understood as a media or ‘boundary object’ for ongoing discussion and sensemaking – not a fixed result established in the ‘vision category’ of workshops. Thus, the value-tree should primarily be seen as a tool for client representatives to become aware and agree (building consensus) on a set of tentative grounds for evaluation as a basis for decision-making. These grounds or qualities may also be understood as factors in CBA terms. Specifically one should consider whether the value-tree needs to be revised at each workshop. This is to ensure the ongoing appropriateness of the chosen qualities as a way to achieve value (not only quality). Accordingly, in the first case-study it was the clarification of needs and qualities in the client-user conglomerate (users are not that mobile, good indoor climate is extremely important) and learning about possibilities (ventilation with heat recovery is possible if you sacrifice the facing brick) that led to changes.

This change in meaning would acknowledge both the experiential learning perspective as well as the process view of designing, and it would, presumably, become easier to ‘sell’ the idea to ‘solution-oriented’ architects. As noted above, some architects are likely to be estranged by the define-design-evaluate sequence and the pre-established value-tree. In connection to this, it may also be noticed that the architects in the second case-study primarily saw the workshop model as a potential means to educate the stakeholders (university and nursery staff) about their opposing requirements.

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37 Recall that solution-oriented, in designing terminology, does not mean: trying to end the design quickly. As argued in Boland & Collopy (2004) architects often like to keep the problem liquid. Here solution-oriented means: discovering the design problem through the production of many solutions (not through initial gathering of information, analysis and reasoning).
Understanding the value-tree as a tool primarily meant for the client/user organization, the designers are free to work in a solution-oriented way. Thus, the designers should not feel obligated to have the value-tree lying next to their sketch pad or specifically document compliance. This is a traditional management control way of thinking and may easily lead to a game of rhetoric. Designers may consider the value-tree as a ‘service-information’. For these reasons the first edition of the value-tree can be developed without participation of design-consultants and contractors (to decrease time spent in meetings – and issue identified in the case-study).

The value-tree should, however, be presented to the designers subsequently for clarification and query. Accordingly, case-study 3 and 4 showed that designers generally would like to know about the overall level of ‘luxury’ in solutions – is it a FIAT or Mercedes. However, in the following workshops the designers should be encouraged to respectfully challenge the value-tree and client perceptions to test whether the chosen qualities are still the most appropriate. Bringing matters to a head, the recommendation can be described as in table 7.5.1 below:

<table>
<thead>
<tr>
<th>Contents of value-tree</th>
<th>Original workshop model</th>
<th>New workshop model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-established “product-values”</td>
<td>Temporary qualities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary function of value-tree</th>
<th>Original workshop model</th>
<th>New workshop model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A vision for educating and controlling designers, who should translate the “product-values” into a product (Vision → Solution)</td>
<td>A media for client self-reflection, consensus-building and sensemaking in relation to decision-making (Vision ↔ Solution)</td>
</tr>
</tbody>
</table>

*Table 7.5.1: Change in understanding of the value-tree*

Of course, if the client-organization is almost unitary and the representatives in charge are experienced, self-willed and possess’ great authority in the client organization(s), it would be inappropriate to place great emphasis on ‘educating’ the representatives.

However, as described in the first case-study, it can be very valuable to an owner (particularly the facility manager) to learn about the difficulties of designing and the trade-offs that need to be made to comply with the budget and schedule. This allows the owner representatives to transfer meaning to other affected parties (e.g. future end-users) and minimize any gap between expectations and outcome (cf. chapter 4.3). Thus, the workshops may not only aid the client-conglomerate to reach consensus about a set of qualities for decision-making, but also be instrumental in educating the client about the nature of design development, which is likely to strengthen commitment and satisfaction through sensemaking.
However, a situation where ‘the tale is wagging the dog’ should be avoided. Thus, the complexity and ‘wickedness’ of the design problem should not be a recurring ‘excuse’ for disregarding the (temporarily) agreed overriding grounds for decision-making. This connects to the social process view of designing, which will be discussed in more detail below. First, however, the interface with briefing/architectural programming will be discussed.

**Interface with briefing**

According to Emmitt et al (2004) the workshop model should be “combined” with briefing, but not seen as a mere supplement; it is stressed that the workshop model should be seen as an integrated part of the briefing and design process to highlight client “product-values” and improve communication. This does, however, not provide much clarity.

Nonetheless, the author sees no reasons why the briefing process cannot run concurrently to the workshops, including the various techniques described in chapter 5.2. These techniques can help structuring a dialogue about the needs of the client organization, its purpose, perceived risks and specific requirements. The brief works as a legal document including information about the background of the project, the site and site environment, the functions of the facility, description of the client organization, its purpose, needs, opportunities and threats etc. The preliminary version of the (dynamic) brief may then form the outset for exploring the value-tree in the second workshop (the vision workshop) and the constraints introduced in the third workshop (the realism workshop). Thus, an overall vision (a primary generator?) can be presented in the vision workshop(s), which could work as an abstraction/summary of the brief. The mission and high-level values of the relevant organizations could likewise be stated in the first or second workshop in a few bullet points as input and background-information for choosing the relevant qualities for the specific project. This may on the other hand confuse the workshop participants, since emphasis should be directed towards the project-specific value-tree (qualities). Nonetheless, the briefing process should be initiated prior to or, at the latest, after the first “partnering” workshop.

Although different solutions may align with the descriptions presented in the brief, they may not be considered equally valuable. The value-tree then provides the more overriding grounds for evaluation of design solutions/alternatives, disconnected from narrow specifications. Accordingly, as described above, the value-tree can aid the client organi-

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38 It may be argued that if values should be displayed as determinants of the qualities in the value-tree, then the author has just introduced yet another ‘layer’. However, these values should be understood as the typical 3-5 words/sentences that almost all larger organizations have today e.g. honesty, fairness, justice (see Anderson 1997).
zation in discussing perceptions of value and make decisions with a sense of consistency and structure. This somewhat aligns with the requisite decision-model category highlighted by Green (1996b). However, Green (1996b) places emphasis on sensitivity analysis, which could also be a valuable add-on to the workshop model (more comments on decision-making will be provided below).

In the briefing literature (chapter 5), drawings and models are described as powerful tools to increase awareness of requirements. Valuable feedback may be retrieved through computer simulations, which are becoming more and more feasible in a ‘sketch’ situation. However, in the original writings about the workshop model it is emphasized that no drawings should be made prior to the vision workshop (e.g. Emmitt et al, 2005). This also aligns with the recommendations made by Kamara et al (2001) with regard to briefing (see chapter 5.2.2). Nonetheless, this again reflects a rational problem-solving view of designing, where the vision should be established before any tentative solutions. When considering the experiential learning view of design, this is debateable. According to this, the vision is likely to emerge concurrently with the exploration of different solutions. Thus, in the second case-study the architects first learnt the real meaning of user needs, when they confronted them with a specific type of cell-Offices (a solution). Also, the architect and technician in the fourth case-study did not understand each other before the technician pointed at a concrete solution (where no wires were visible). On the other hand, the university office-building project (case-study 2) illustrated the potential risk of premature commitment to solutions, when detailed drawings were made before boundary conditions had been settled. To balance these two concerns, it is argued that the vision workshop should be held at a very early stage and, as argued above, the value-tree should be allowed to be modified in subsequent workshops.

**Acknowledge the social process view of designing**

Emmitt et al (2004, 2005) argue that the gathering of participants in workshops and the sharing of values will help to accomplish improved communication. However, based on the case-study findings, it is argued that more can be done to enhance communication – especially to avoid distortion of communication. In addition, the workshop model adopts the concept of a facilitator, but does not provide much guidance on how to carry out this function. Thus, in line with the more generic recommendations provided above, the three metaphors and the VIV model can be adopted to remind the facilitator about potential pitfalls (e.g. those which were identified in the case-studies). This may help the facilitator to make appropriate interventions as described above. Considering the added complexity of gathering all participants from the outset (cf. case-study 4, and chapter 4.2), there is a need for well-developed structures and leadership/facilitation in
meetings, in order to reap the assumed benefits of early involvement – otherwise the many concerns, which are represented, may lead to paralysis.

In addition, to overcome the issue about professionals’ reluctance to ask questions (which is fundamental to group effectiveness cf. chapter 4.3), interview sessions could be useful. Through interview sessions, the actors can be ‘forced’ to ask each-other questions about ambiguity and doubts. In addition, A3 poster reports may be adopted to display different alternatives concisely, which can be circulated prior to the workshops to aid communication. Alternatively, the facilitator should be aware of providing informal breaks, which can generate questions that are not asked in public. Furthermore, to stimulate reflection and help balancing the various interests; it may be beneficial to include the facilitator in the ongoing design meetings. This would expand the concept to deal with the design process taking place in between workshops – as called for in Emmitt et al (2004).

The inclusion of the facilitator may especially be relevant after the Realism workshop(s), when engineering consultants and contractors become more engaged in the process. Thus a facilitator may be somewhat ‘redundant’ in the beginning, when it is mostly a matter of architectural creativity to establish the overall design sketches. In addition, a practical barrier to this recommendation, at least in a Danish context, is to define the legal responsibility of such an ‘independent’ facilitator, who coaches and thereby interferes with the contractors and design consultant’s work procedures. For this reason the role (and power) of the facilitator should be discussed and clarified in the first workshop. Various constellations can be thought of, but whatever the case may be, it would be advisable to avoid taking responsibility for the design solutions – the facilitator need to keep a certain distance and not get entangled into discussions over technical matters (Philips & Philips, 1993). However, this is arguable difficult in practice. In addition, the facilitator may need to take some responsibility for timely completion of design tasks, if the facilitator, for example, asks for more design alternatives and takes an active part in coordination and planning. The roles and responsibilities should, however, be made explicit and agreed at the outset (although they, as everything else, may be subject to change). An alternative could be to strengthen/ensure the project or design leader’s competences in communication and group dynamics/facilitation. In connection to this it is noteworthy that the researchers working on the Generic Design and Construction Process Protocol (GDCPP) – described briefly in chapter 3.2 – also recommended a new process management and change management role/function.

When considering values-based management, it may also be beneficial, in the first partnering workshop, to make explicit (to the extent possible) the individual participant’s
values and preferred product qualities as a way to highlight differences – instead of only displaying the client’s value-tree and shared organizational values.

In promoting the workshop model, Emmitt et al (2005) argue that in a perfect market, the consultants and contractors should be aiming to deliver client value – otherwise the clients will go elsewhere. Implicitly it is argued that if organizations do not strive to deliver value to the customer, they will lose market share and profit, and ultimately cease to exist. Although the assertion seems reasonable, there is – as described in chapter 3 – no scientific evidence in support of the claim that stakeholder management is linked to high performance and profit. In addition, based on the case-study findings, it is rather obvious that ‘reality’ is more complex. There is no need to pretend that actors will set aside their own preferences and individual values. Accordingly, the differing product qualities that are favoured by each participant may as well be made explicit up front (in a few bullet-points or in a plenum discussion). Explicit reflection on these differing preferences is likely to spur a more ‘open’ and less manipulative conversation. Attempts of persuasion are easier recognized, but also respected as manifestations of involvement.

Regarding the display of individual values; Mills et al (2009) emphasize the motivational aspect associated with self-awareness, which not only the client (representatives) may benefit from. The Schwartz Value Survey (SVS) can be used for this purpose (as in the VALiD approach). To achieve ‘cognitive support’ and make it all more concrete, specific considerations of behaviour should be considered (cf. chapter 4.1 and 5.3). However, a balance should be struck to avoid too much lofty ‘value-talk’, which may discourage some practitioners (cf. case-study 1). Thus, the SVS may be perceived to be too complex and lengthy in a practical context.

**Supplementary comments**

It should also be mentioned that because the workshop model is somewhat rooted in value-management and lean, no additional recommendations will be made based on these concepts; except that one could imagine a combination with TVD/target costing and, as mentioned above, the use of A3 reports. The inventors themselves have suggested the use of QFD (Emmitt et al, 2004) and, in the detailed design phase, the use of Last Planner System®. However, in the author’s opinion, the use of QFD will easily become cumbersome in a changing, iterative environment.

In addition, the above recommendations, which revolve around responsiveness to change, align with the reasoning behind Agile Project Management (APM). The literature on agile is mostly confined to the software development industry and lacks scien-
tific examination/validation (Leybourne, 2009). Because of this, and for the sake of limitation, the author has largely ignored the concept. In addition, some would argue that at least the early versions of lean and agile production are almost the same. Thus Barlow (1998) suggest that lean is a prerequisite for agile production. However, agile places even greater emphasis on responsiveness and customer value (Barlow, 1998). Nonetheless the relatedness is worth mentioning and (construction) APM can be highlighted as a topic for future research.

Furthermore, decision-making has been touched upon, but not specifically addressed. There are arguments for adopting a very structured concept such as Choosing By Advantages. The contents of the value-tree could be seen as ‘factors’ to be broken down into criteria and attributes for each design alternative. On the other hand, as noted by Ryd (2004), ‘incomplete’ somewhat abstract requirements can be difficult to criticize, give room for innovation and encouraged commitment. A review of various models for decision-making is provided in Green (1996b). The topic will, however, not be treated any further here.

In addition, having advanced the argument that change should be embraced, it also seems appropriate to point at the golden mean. The iterative nature of designing should not be granted omnipotence. Gate-ways need to be established, to ensure progress and reduce complexity (cf. chapter 5.2.2). Iterations can be performed in-between phases. Thus, the realism workshop can function as a gate to the design development phase, and the criticism workshop can function as a gate to detailed design. Accordingly, as noted in the chapter 4.3, it seems most beneficial to involve client and users in the early stages of design.

Lastly it should be mentioned that the relevance of the workshop model seems dependent on a number of overriding factors. Thus during the interviews the architects in case-study 1 argued that it would not make sense for a ‘short-sighted’ developer or most other turn-key contractors to adopt the workshop model, since these types of actors (traditionally) have cost and short-term exchange value as their overriding concerns. In addition, the project needs a certain size to justify the expense of workshops. Furthermore, appreciation and encouragement of design as an iterative and evolving endeavour has implications for cost-management. The client can set an overall target price, as a known boundary condition for designers, pay by the hour or be willing to constantly negotiate the price. Various other alternatives may be possible (e.g. a combination as in target costing). However, what is not possible is to ask consultants and contractors to make a fixed bid without them knowing the scope of the service they are to deliver – this is likely to result in large contingencies and an ongoing discussion (controversy). A summary is provided below.
Summary

In summary, it is recommended to change and supplement the workshop model in the following respects:

- Adopt the term *qualities* instead of “product values” to denote the parameters of the value-tree
- Adopt the notion *organizational values* instead of “process values”
- Understand the value-tree, primarily, as a changeable design management tool for client sensemaking and decision-making (not a fixed vision to be ‘translated’)
- Understand the workshop model primarily as a means to educate the client – not only the designers (except when the client is unitary, highly experienced and self-willed)
- Make the interface to briefing/architectural programming explicit: briefing establishes the vision, the workshop model aids the social process and, particularly, client decision-making
- Be explicit about what product qualities that non-client participants favour
- Display the individuals’ potentially differing values (not only shared organizational values), consider concrete behaviour, but confine the ‘value-talk’.
- Emphasise the competences of the facilitator (or chair of the meetings) – she needs to understand communication and group dynamics, in addition to technical aspects. In order to reap the benefits of early involvement, good facilitation is needed
- Discuss and agree the role and power of the facilitator at the outset (Workshop 0), and be prepared to revisit as the project evolves to reflect changes within the project organisation
- The facilitator can adopt the three metaphors: Part-whole conversation, social process and hyper-reality, as well as the VIV model, to reflect on the situation and see potential pit-falls
- Include interview sessions as part of the workshop meetings
- The facilitator may need to attend design meetings in between workshops

The recommendations are illustrated in figure 7.5.1 below, which summarizes the ‘new’ workshop model in a flow chart (changes to the original concept are marked with red font colour).
Figure 7.5.1: New flowchart of the workshop model process
(Changes are highlighted with red font colour)
To the benefit of international readers, the workshop model has been mapped against the overall process model described in chapter 3. Correspondingly with the above arguments (e.g. about briefing and the use of drawings), the first partnering workshop should be held in the initial pre-design phase. The vision and realism workshops will then follow in the subsequent concept phase, where the last realism workshop marks the gate to the design development phase. In this next phase the criticism workshops are conducted, which also provides the gateway to detailed design. In general the phase transitions may work as gate-ways to ensure progress.

7.8 Critical reflections on results and recommendations

Within this section, the research is discussed in relation to the earlier stated criteria for good research (cf. chapter 2). In addition, critical reflections are made, which have been inspired by critical theory and postmodernism⁴⁹.

As substitutes for the conventional notions of validity and reliability the following criteria for good research were listed in the methodology chapter (Alvesson & Sköldberg, 2000:276):

1. Empirical ‘arguments’ and credibility
2. An open attitude to the vital importance of the interpretive dimension to social phenomena
3. Critical reflection regarding the political and ideological contexts of, and issues in, research
4. An awareness of the ambiguity of language and its limited capacity to convey knowledge of a purely empirical reality and awareness about the rhetorical nature of ways of dealing with this issue (the representation-authority problem)
5. Theory development based on the mentioned issues

In relation to the first item, the research is built on four case-studies, including 23 interviews (with 24 different practitioners), observation of 39 meetings and reading of various project documents (including 67 product change proposals in the third case-study). In order to increase credibility, sound- or video recording has been used to the extent possible. Thus all interviews and 13 of the observed meetings have been sound-recorded, in addition to 4 design meetings, which have been video-recorded. This material has subsequently been transcribed and is accessible to the evaluation panel (but con-

⁴⁹ The hermeneutic perspective is considered somewhat inappropriate for self-evaluation, since it would encompass the question: what is the meaning of my own recommendations?
fidential in relation to the wider public). An overview of the data collection performed is provided in table 7.6 below.

In addition, the researcher has provided ‘rich’ accounts, which include many quotes to strengthen the argument (which also explains the length of the thesis). Furthermore, all the resulting analyses have been sent to the respondents and affected practitioners\textsuperscript{40}, who have had the opportunity to make comments not only regarding the quotes but also the interpretations. In the end 29 of 35 practitioners and client/user-representatives responded to the enquiry for approval (all approved).

Consequently, the arguments rest on a comprehensive amount of first-hand data, a lot of which has been ‘collected’ in a natural setting. This, together with the resulting analyses, has subsequently been exposed to outside scrutiny. It is therefore argued that the research has a high credibility.

<table>
<thead>
<tr>
<th>Data collection Case-study projects</th>
<th>Interviews**</th>
<th>Number of People interviewed</th>
<th>Meetings observed</th>
<th>Participants Who approved* the analyses</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social housing</td>
<td>7</td>
<td>9</td>
<td>3</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>University office building</td>
<td>0</td>
<td>0</td>
<td>15 (13**)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td>16</td>
<td>15</td>
<td>17</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>University Guest House</td>
<td>(1****)</td>
<td>0</td>
<td>4 ***</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>In all</strong></td>
<td><strong>23</strong></td>
<td><strong>24</strong></td>
<td><strong>39</strong></td>
<td><strong>29</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Nobody disapproved. **All sound-recorded, ***All video-recorded, **** A half-an-hour telephone meeting about the draft analysis

Table 7.6: Overview of data collection in all case-studies

Of course, as pointed out earlier by means of source criticism, there are some limitations. The interview respondents (and researcher) may have had various ‘biases’ in their statements (building identity, using the researcher as way to publish a broader concern, reproducing dominant narratives etc). In addition, the researcher set out primarily to investigate the conceptual phase of construction projects, but two of the case-studies, case-study 1 and 3, where observed in the detailed design phase. Nonetheless these case-studies were incorporated because they provided first hand observation of state-of-

\textsuperscript{40}With a few exceptions, which includes those who have participated in larger meetings without taking active part or with a very limited role
the-art management concepts in practice. In addition, the hospital case-study provided (anecdotal) interview data as well as documentation (A3 reports) regarding earlier events. Thus all things considered the researcher believes that these two case-studies have helped ‘broadening the picture’ and qualified the assessment of these contemporary management concepts.

As described in the methodology chapter, it may however be argued that the ‘broadening’ has been at the expense of depth. When focusing on the local processes of group interaction, some would probably argue that a more rigid (grounded theory) coding of value-expressions, framing, naming etc. should have been performed. However, this is essentially a discussion of epistemology. Arguments ‘against’ coding will not be repeated here (see instead chapter 2).

Specifically in the university guest-house case-study, it would have strengthened the interpretations if different types of information-sources had been utilized – only the video footage was accessible. In this case, the subsequent approval of the analysis, by some of the meeting participants, is particularly important. However, only 3 out of 7 responded to the enquiry and it was, in general, difficult to get hold of the participants (the project had been cancelled long before the draft analysis was ready). This is somewhat outweighed by the fact that the meetings were video-recorded in this particular case-study. This makes the data open to ‘scrutiny’ by the evaluation panel. Also, one of the participants gave a telephone ‘interview’ about the draft-analysis (which has not been recorded).

In addition, the researcher has been explicit about these limitations and attentive to the subjectivity in interpretations (item 2). Furthermore, reflections have been made in all case-studies inspired by critical theory and postmodernism, where item 3 and 4, in the above list, have been addressed.

Of course, one may still argue that four case-studies are still a limited ‘sample’ as a basis for ‘generic’ recommendations. On the other hand, only a single case-study can be enough to reject a theory or common understanding. Also, a number of empirical examples, together with theoretical reasoning, may provide a reasonable argument – especially if one accepts that there is no objective ‘truth’, only more or less well argued conceptions of the world.

In view of this, the author is rather confident in stating that local social/interaction processes are likely to have a high impact on design development and consequently value creation. In addition, the researcher feels confident in arguing that these dynamics have largely been overlooked in the various management concepts described in chapter 5.
Therefore it is argued, that there is considerable room for improving design/value management in this respect. The VIV model provides an outset, which also meets the fifth criteria in the above list.

The more instrumental recommendations should, however, only be seen as propositions based on theoretical reasoning. The recommendations would need to be ‘tested’ before anything more certain can be said about them. However, in the same way that the data has been subjected to meta-theoretical reflections, the findings and recommendations may likewise.

Thus, inspired by critical theory, one might ask: who are the winners and who are the losers (Alvesson & Sköldberg, 2000)? Can the recommendations be seen as yet another attempt to promote management consultants and oppress designers? The VIV model may serve to illustrate the complexity of designing and the need for a saviour – the engineering consultancy company that has sponsored the research. Particularly, the recommendation about a facilitator can be interpreted as an effect of the author’s wish to become one. In addition, with reference to the initial interpretations made in the method chapter, it can again be argued that the workshop model is a structured way to manipulate the client – by ‘educating’ him. The facilitator becomes the ‘parent’ or ‘shepherd’ (Gottlieb, 2010)

Accordingly, the critical theory ‘lens’ is always instrumental in seeing manipulation and domination. Consequently, a postmodern reflection may be that the social process view of designing, which has been highlighted several times and underpins the recommendations, may be an effect of the meta-theory (critical theory). It is somewhat tendentious that manipulation can be found in all case-studies. Whether this is a strong indication of the prevalence of this phenomenon or just a researcher/theory-bias is up to the reader. In the same way, the experiential learning view may have worked as a straightjacket, leading the researcher to over-emphasize iteration and learning. Instead of making ‘outside’ interpretations, the researcher could have placed more emphasis on how the actors, themselves, understood their actions – as problem-solving, as experiential learning, as politics etc. Interview statements in case-study 1 and 3 did, however, reveal that some architects felt estranged towards a ‘problem-solving’ piece-meal approach and some explicitly described acts of persuasion and rhetoric as relevant factors in design development. Also, as stated several times, all case-study participants have had the opportunity to comment on the analyses and most of them approved, while nobody disapproved (some did not respond).
Finally, the above recommendations about reflection and embracing change can be seen as an effect of a contemporary societal trend. Thus the researcher can be seen as a puppet of the post-traditional, reflexive society – or the dominant narrative about it.

To be self-critical of one's own recommendations is a somewhat difficult endeavour. When writing the critique the author still has the possibility of going back and changing things – if the critique becomes intolerable (the researcher still needs to get his degree). Therefore, additional critique is, at this point, up to the evaluation panel (and any other reader).

Finally, the author would like to make the following suggestion: All descriptive researchers should at some point try to be prescriptive. It is much easier to analyse, deconstruct and criticize, than to develop practical recommendations that are also scientific robust. Paradoxically the latter becomes even harder, the more knowledge one has attained.

A summary of this chapter will not be provided, since most of the key points will follow in the concluding chapter below.
8 Conclusion

In this final chapter, the conclusions of the thesis are summarized. First the notions of value and values are outlined. Then answers to each of the two descriptive research questions are revisited. This is followed by a suggestion for theory development (the VIV model) and a brief presentation of the implications for construction design management. Then the instrumental recommendations, spurred by research question 3, are presented. Finally the overall contributions to knowledge are summarized and suggestions for future research are offered.

8.1 Value and values

Broadly speaking, this thesis is about value creation in construction design processes. To provide a background for dealing with this abstract notion, an initial literature review was conducted. This lead to the following essentials about value and values, which may be seen as a contribution in itself (the same list including references can be found in chapter 4.1):

1. Value will in most cases be a subjective judgment depending on human interests, and which is structured by needs, purposes, values and situational factors

2. The term “value” (a judgment) can be distinguished from the term “values”: the individuals core ideals or the ends by which we assess the appropriateness of our desires
   
   i. Values somewhat guide behaviour, but can easily be overruled by situational conditions
   
   ii. Values are likely to ‘frame’ value judgments
   
   iii. Values may change through experience and contemplation

3. An item can in some cases be objectively measured as more or less valuable compared with another item

4. The objective valuation (often) depends on context/situational factors e.g. what the environment can supply, group consent, frame of reference etc.

5. As a consequence of no. 1, 2-iii and 4 some (if not all) value(s) changes over time

6. However a valuation can be said to be more durable if many people agree on it and it is based on “right” assumptions/information
7. Value can be instrumental

8. Value can be found not only in connection with a physical object (e.g. utility value & exchange value), but also in activity, love, goodness, friendship, knowledge etc. Specifically value can be experienced within a process. This may be termed process value.

9. Value is also distinct from quality which can be viewed as the level of objective fulfilment of prescribed requirements/qualities. Value is determined by the appropriateness of the chosen qualities and their fulfilment.

It was also noted that the discussion of value and values may be an irresolvable matter of ontology. The research did not give raise to changing any of the above distinctions. However, many were confirmed and they provide a terminology that is essential for the answers and recommendations that follow below.

8.2 Research questions revisited

8.2.1 Research question 1
The initial question was essentially; how should construction project design processes be managed with the objective of maximizing client and user value? To this end the project can be seen as an effect of a current management discourse, where customer value is the slogan (cf. chapter 3).

However, in an academic context, such a question needs modification to become operational. First of all, the literature seemed to be wanting in explaining the notion of value in construction design processes. The first research question was therefore: How do the client and other project stakeholders’ perceptions of value manifest in conceptual construction project design-processes? Based on four case-studies and theoretical reasoning, the following answer was provided:

The project participants’ perceptions of value are likely to manifest in the argumentation for and against design solutions and in any project documents that may form the basis for decision-making, particularly in frame-negotiations (Type-2 conversations).

Depending on ontology, the participants’ perceptions of value seem heavily structured by – or manifest through – their professional role-frames. Their perceptions of value are likewise greatly affected by situational circumstances – not only values, which seem relatively robust.
The notion frame-negotiation is a product of Schön’s (1991) theory about the reflective practitioner, where Schön depicts architectural designing as a ‘conversation with the situation’. This can also be referred to as the experiential learning view of designing. According to this, the designer initiate the ‘conversation’ by imposing a frame, which can be understood as a window on the problem that sets boundaries for attention and determines what is considered to be appropriate data, solutions and values (Stumpf & McDonnell, 2002; Lawson, 2006). Because designers have different backgrounds they are likely to frame the situation/design problem in different ways, which leads to frame-negotiations. Accordingly, in this thesis, it is argued that perceptions of value are particularly manifested in these frame-negotiations.

The notion ‘Type-2 conversation’ is introduced in this thesis. It refers to the experiential learning view of designing, where design is actively created, but where the participants, who are taking part in the design conversation (in collaborative design work), are having a concurrent more or less implicit frame-negotiation (and argument over relevant ‘disciplines’ – see definition below). This is to be distinguished from Type-1 conversations, which likewise refers to the experiential learning view of designing, but only concerns the exploration and integration of various technical and architectural aspects of the design – the conversation with the situation, without any ‘struggle’ over relevant qualities. This distinction has not been ‘proven’ in the thesis, but can be seen as a proposition, which explains why some scholars are successful in describing designing as a problem-solving activity and others are successful in describing it as a much more complex social process.

In connection to this, it was found that the participants were heavily structured by their role-frames. Thus, in the discussions over alternatives, the participants expressed perceptions of value that seemed rather stereotypical for their profession (as engineers, architects, contractors etc.). It appeared that the actors had adopted the traditional values associated with their profession, which to some extent guided their perception of value. On the other hand, they may have chosen a role-frame that aligned with their perception of value. If this is the case their perception of value manifested in their choice of role-frame.

Accordingly, values seemed rather robust and ingrained in the identity of the professions, but this did not mean that perceptions of value were stable. As different parts of the design-problem were abstracted, addressed and refined, new meanings and preferences emerged in relation to the ‘parts and the whole’ of the design. This was particularly confirmed by an analysis of reasons for making 53 design changes as well as 67 product change proposals in case-study 3. Accordingly, an important distinction confirmed in this thesis is the distinction between values and value. Corresponding to the
literature review, value seems to be a fleeting subjective judgment depending on needs, purpose, values, frame-of-reference and other situational and social factors. On the other hand, values in plural, is the individuals’ core beliefs and ideals. Thus it has been argued that a key distinguishing feature between values and value is the pace of change.

These findings have immediate implication for value management. However, before continuing with the more instrumental recommendations, attention will be directed to the second research question.

8.2.2 Research question 2

In order to give recommendations to design management, it also seemed relevant to explore what ‘issues’ could be identified in current construction design processes in relation to the conceptual purpose of providing client value. The second research question was therefore: What issues can be identified in conceptual construction project design-processes in relation to management of client value creation?

Various issues were identified. Some issues seemed to relate specifically to the idiosyncrasies of the case-study projects (and the management principles applied). Other issues were found in all or most of the case-studies. These are summarized in the answer to research question 2;

General issues identified in case-studies in relation to client value creation:

1. Distortion of communication as a result of:
   a. Value-laden attempts of persuasion (Case 1, 2, 3, 4),
      Including selective presentation of information (Case 2, 3, 4)
   b. Knowledge imbalance/codified language (Case 1, 2, 4)
   c. Power structures (Case 1, 2, 3, 4)
2. Architects estrangement towards (engineering) management rationality (Case 1 & 3)
3. Hyper reality and/or un-reflected dogmatism (Case 1, 2, 3)

The issues identified mostly relate to communication and group-dynamics theory and highlight the relevance of a supplementary social process view of designing. Thus, in the local design meetings, participants were (more or less consciously) trying to persuade each-other to adopt preferred solutions by means of rhetoric and selective presentation of information.

Specifically, the second item concerns the two case-studies, where a well-articulated management concept had been adopted – inspired by value-management and lean in
both cases. In these cases the architects seemed somewhat estranged towards the management rationality applied – it was a bit too analytical and ‘rational’ for their liking.

Finally, the case-studies pointed at the risk of dogmatism in relation to the adoption of a single overriding management concept, as well as ‘hyper-reality’, where some participants became somewhat self-affirmative and lost their ability to see ‘other’ realities.

8.2.3 Theory development and implications
Spurred by the result of the answers to research question 1 and 2, the VIV model was developed (see below). The model is heavily inspired by Schön (1991) and aims to illustrate the complexity of influences on the development of partial solutions in a ‘collaborative’ design process, which ultimately determines the value of the product. The model is not exhaustive of all influences (which is symbolised with the question marks), but includes:

Disciplines: The notion of disciplines covers (1) The bindings associated with other design solutions; (2) the participants’ preferred qualities, which are somewhat structured by values, purpose and needs; (3) the bindings imposed by the overall design idea and other situational constraints (e.g. time and resources)

Theory: The overall theories of the designers (e.g. knowledge of structures, architecture etc.)

Habit: The mental stock of precedent solutions (references/experience), which the designers feel comfortable with

Rhetoric: Group participants’ differing abilities to rhetorically argue for and against design alternatives

Information: The information available and known by designers

Power: The formal and informal power-structures in a group

Media: The design tools used to develop, describe and assess solutions (e.g. sketch pad, spreadsheets, computer model etc.)

As described above, especially the ‘disciplines’ are likely to be structured by the various participants’ values. However, in a group, the values of the participants are different, since they, at least, are structured by the participants’ different role-frames and professions (history and culture are also likely to have an impact). Nonetheless some values
are likely to coincide, which are described as ‘project values’ (they may also be termed organizational values). Thus depending on the strength of the different influences (vectors), which also depends on the specific configuration of participants at different points in time, the partial solutions are likely to be ‘skewed’ in different ‘directions’ in relation to the values of the participants.

![Figure 7.3.2: The Vector model of Influences on Value creation (VIV model)](image)

If the above arguments are accepted, the implication is that current management concepts are only addressing some of the influences (primarily information, theory and disciplines) and they may therefore have limited impact. This is because:

*Value is actively created in the selective choosing, comprehension of and argument over relevant solutions in the local context*

Specifically aimed at value management and values-based management (and partnering), an implication is:
Client value creation is, therefore, unlikely to be ‘controlled’ via auditing against written statements of preferred qualities or overall organizational values

Thus traditional value management seems mostly to be a question of providing a clear understanding or consensus about client values (or qualities) and mechanisms that can ‘translate’ these abstract requirements into design solutions. However, consultants and contractors are not mere problem-solvers or servants of client value; they are people with opinions who sometimes make an effort to influence the design to their own liking.

In addition, it is often argued that a clear understanding of client values (qualities) at the outset will mitigate costly iterations in the latter stages of design and construction. However, based on the above findings, this seems questionable. Not because values change, but because design is an ongoing conversation that includes elements of learning and negotiation, which is affected by the people (and professions) who participate in the local discussions. Thus preferences (value-judgements) may change as meanings change and compromises are needed in a social process.

When considering management approaches such as process-protocols, lean and briefing, it was argued that they also lack mechanisms to handle (local) social processes. This ‘critique’ of existing management concepts should not, however, be seen as a rejection of the concepts – the concepts surely provides valuable tools and methods for design management – the author only aims to point at their limitations and make suggestions for improvement. These are provided below.

8.2.4 Research question 3
Thus, the above findings and reasoning lead to the third and final research question: What recommendations can be made – on the basis of the theoretical and empirical findings – concerning construction design management in general in relation to the conceptual purpose of client value creation? Inspired by the analytical framework, this lead (in brief) to the following overall recommendations:

Recommendation to design management:
To stimulate greater awareness of the nature of designing and social group processes by means of the VIV model, and thereby encourage reflection and self-adjustment. The reflections may also take outset in the following three metaphors:
1. **Part-whole conversation:**
   Seeing design as a part-whole conversation may help participants to acknowledge and embrace the iterative nature of designing and adopt appropriate strategies. Within the design conversation, the group may become more aware of the implicit ‘disciplines’ that are associated with the naming of design elements, as well as their individual framing of the problem and the precedents/habits they may be based on. Furthermore the participants may consider the notions of Type-1 and Type-2 conversations.

2. **Game of persuasion**
   Seeing design as a game of persuasion may attune the facilitator or participants’ attention towards the substance and rhetorical contents of information. In addition, various methods may be used to minimize dominance and decode codified language. Furthermore the group may become more aware of the threat of loss to some participants in relation to decision-making.

3. **Hyper-reality**
   The hyper-reality metaphor may stimulate reflection on prevalent narratives, which need to be qualified or rejected through confrontation with alternative conceptions of ‘reality’. This is to avoid one-sided dogmatism or group-think.

   This may entail the use of an external facilitator.

Specifically in relation to the value management workshop model, which formed the outset of the research, the following recommendations were suggested:

1. Adopt the term *qualities* instead of “product values” to denote the parameters of the value-tree
2. Adopt the notion *organizational values* instead of “process values”
3. Understand the value-tree, primarily, as a changeable design management tool for client sensemaking and decision-making (not a fixed vision to be ‘translated’)
4. Understand the workshop model primarily as a means to educate the client – not only the designers (except when the client is unitary, highly experienced and self-willed)
5. Make the interface to briefing/architectural programming explicit: briefing establishes the vision, the workshop model aids the social process and, particularly, client decision-making
6. Be explicit about what product qualities that non-client participants favour
7. Display the individuals’ potentially differing values (not only shared organizational values), consider concrete behaviour, but confine the ‘value-talk’.
8. Emphasise the competences of the facilitator (or chair of the meetings) – she needs to understand communication and group dynamics, in addition to technical aspects. In order to reap the benefits of early involvement, good facilitation is needed
9. Discuss and agree the role and power of the facilitator at the outset (Workshop 0), and be prepared to revisit as the project evolves to reflect changes within the project organisation
10. The facilitator can adopt the three metaphors: Part-whole conversation, social process and hyper-reality, as well as the VIV model, to reflect on the situation and see potential pit-falls
11. Include interview sessions as part of the workshop meetings
12. The facilitator may need to attend design meetings in between workshops

The first two items can be seen as a matter of theoretical adjustment of terminology. However, they involve a significant change. Thus, although the notion of ‘qualities’ are adopted, the change actually involves greater emphasis on value. The reasoning is that the original notion of “product-values” seems rather fixed and pre-established. However, a high level of compliance with fixed, pre-established parameters is likely to result in high quality, but not necessarily high value. As opposed to quality, value is dependent on contextual appropriateness of the grounds for evaluation (the qualities). Therefore the grounds should not be fixed but responsive to relevant changes in circumstances – and qualities seem less fixed than values. This also aligns with the experiential learning view of designing. The third and fourth items likewise indicate a shift from a more problem-solving view of designing (vision-development-evaluation) to the conversation view of designing. In relation to the value-tree, which is often used in value-management approaches, the shift in emphasis is illustrated with the table below:

<table>
<thead>
<tr>
<th>Contents of value-tree</th>
<th>Original workshop model</th>
<th>New workshop model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-established “product-values”</td>
<td>Temporary qualities</td>
<td></td>
</tr>
<tr>
<td>Primary function of value-tree</td>
<td>A vision for educating and controlling designers, who should translate the “product-values” into a product (Vision → Solution)</td>
<td>A media for client self-reflection, consensus-building and sensemaking in relation to decision-making (Vision ↔ Solution)</td>
</tr>
</tbody>
</table>

*Table 7.5.1: Change in understanding of the value-tree*
With the fifth item, it was argued that the interface with briefing needed to be more clarified. In addition, item 6 and 7 pointed at the need to acknowledge the differing interests of the participants, which are unlikely to be set aside by overall client value statements or agreed organizational values. The last three items directed attention towards the more generic recommendations provided above; in which it is suggested to emphasize the competences of the facilitator and pay attention to codified language and group interaction. These recommendations were summarized in a new flow-chart of the workshop model shown in figure 7.5.1 (in the synthesis chapter).

8.3 Contributions to knowledge
In general, the thesis contributes to the emerging literature on construction design management, which is still in its infancy. In addition, the theory part of the thesis contributes with a somewhat philosophical perspective to the topical discussion of value and values in construction management literature. A juxtaposition of five significant process-protocols from the UK, US and Denmark was also conducted. In relation to designing theory, the empirical basis provides a solid contribution, since it is relatively seldom that researchers are allowed to make first-hand observations of design-meetings in their natural setting – especially when using sound and video-recording. However, more significantly the thesis describes – by means of four case-studies – how value perceptions manifest in construction design processes. Furthermore various issues in relation to client value-creation were identified in the case-studies. In connection to this, the VIV model was developed, which provides a new framework for understanding the link between designing and value-creation. Accordingly, this model was used to show the limitations of current construction design management concepts, and pointed at areas for future improvements. Specifically it was suggested to adopt the VIV model and three metaphors for reflection in group-problem solving – which may be guided by a facilitator. Thus, the thesis provides an initial ‘competence-basis’ for a construction design group facilitator. Furthermore, in the instrumental area, the study includes the first scientific and critical examination of the ‘workshop model’, which led to various recommendations to strengthen the design management concept. These recommendations have been incorporated in a new (flow-chart) version. Finally, the thesis introduces an innovative methodology in construction design management research by adopting (and adjusting) the ‘Reflexive methodology’ developed by Alvesson and Sköldberg (2000). This approach proved to be practicable in a complex socio-technical analytical context.

8.4 Topics for future research
A natural extension to this research would be to test the new version of the workshop model, which is something that was beyond the scope of the current study. However, as
argued before, this is also very difficult for a number of practical and methodological reasons. Nonetheless, the notions of leadership, coaching and facilitation, not only confined to the arrangement of workshop processes, may be promising topics for future research – within the realm of construction design management the literature seems sparse. In addition, it would be interesting to further explore the concept of agile project management (APM). Finally, the author would have liked to dig more into the literature on informal decision-making in ‘local’ group processes (as opposed to large workshop gatherings). How are decisions formed and made in design processes, before they become official? For example, the current study points at the likely influence of rhetoric, but it has not been determined to what extent this really matters. Such research could provide additional understanding of value creation in construction.
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Appendix 1: Process models

The most espoused benefits of using process models as a design management tool is the achievement of consistency and integration, which consequently leads to a more predictable outcome (Tzortzopoulos & Sexton, 2007). Accordingly it is believed to provide a platform for learning and development of best-practice. Thus, with the earlier distinction between ‘models’ and ‘maps’ in mind, this corresponds with the idea that the development of “to-be” process models should build on “as-is” process maps (Tzortzopoulos et al, 2005). Yet, the distinction between descriptive process maps and prescriptive process models is not so clear cut, because process maps are also likely to be idealized representations of practice. They may in fact be old “to-be” models, which have been accepted as valid representations of reality. On the other hand, maps may be quite accurate if they are based on recurring, standardized, company specific processes, as it is often seen in manufacturing. Thus, distinction should be made between one-off multi-organisational project processes, as it is often the case in construction, and company specific recurring processes. In addition, “best-practice” models often include both a descriptive (as-is) and prescriptive (to-be) element in the sense that they often (descriptively) refer to a specific company practice (e.g. Toyota’s production system), which is considered to be best-practice that (prescriptively) can inspire other companies.

However, in spite of wide-spread popularity, recent research indicates that process models often fail to provide the intended effect as a vehicle for standardization and improved performance in construction – at least when trying to apply them as generic models on multiple and diverse projects (Winch & Carr, 2001; Tzortzopoulos et al, 2005; Tzortzopoulos & Sexton, 2007). In particular, Formoso et al (2002) conclude – based on a literature review – that the fuzzy, iterative design process cannot be described in detail via pre-established process stages.

Accordingly, in a review of design processes in eight design- and production companies, including 2 architectural practices, 4 industrial design and manufacturing firms and 2 building component suppliers, Beim & Mossin (2004) observed that only one company, a large building component supplier, had adopted an ‘external’ generic process model (Coopers stage-gate®, Cooper, 1993) whereas six companies had developed their own unique process descriptions. Five of them worked systematically with clearly defined process models. In general the interviewees believed that a process model should be adapted to company culture and employee competences (Beim & Mossin, 2004). Furthermore, these company
specific processes were (except one) also modified continuously in relation to project and product specific characteristics. The differentiation of the design processes was based on considerations whether the task was open-ended/ambiguous or more tied-up, precisely defined, as well as the type of customer; whether she was experienced or inexperienced and whether she was the final end-user or not etc. (Beim & Mossin, 2004). Many of the interviewees also highlighted the iterative nature of design development and consequently the limitations associated with the representation of the process in a linear process model. All this seriously challenges the idea of creating a more detailed generic (design) process model for construction projects.

As a natural responds to failure of a promising idea, it has been argued that unsuccessful adoption of process models may be due to incorrect usage. Hence, lack of implementation strategy and appreciation of people issues may be key barriers for successful adoption (Tzortzopoulos et al., 2005; Tzortzopoulos & Sexton, 2007). Also, the reasons for using process models may be misconceived. According to (Tzortzopoulos & Sexton, 2007) the idea of generic process models was developed under a traditional project management perspective, where managers are to perform centralized planning, monitoring and control. Instead, it is argued that a ‘softer’ learning perspective should be adopted, where models are developed through user reflection (Tzortzopoulos & Sexton, 2007). Corresponding to this, Winch and Carr (2001) suggests that a methodology for creating project specific processes is needed.

However, instead of the model/map distinction, Cooper & Press (1995:36) have made the following categorization of perspectives: (1) the internal creative process of design and (2) the external productive process of design. The internal process refers to the designer’s mental problem-solving process, when undertaking a design task, whereas the external process is the strategic planning of product development. Building on the work of Lawson (2006), Cooper & Press (1995) depicts the internal creative process via the five stages shown in figure A1.1:

However, Cooper & Press (1995) also acknowledge that in reality the process is seldom linear because new information emerges continuously and the designer

41 Within the context of industrial design management
may need to go back to an earlier stage and perform iteration. This problem-solving process usually takes place in a broader company context or project process; the external productive process of design, which consists of the four generic design phases shown in figure A1.2:

Prior to the concept phase a client brief should be developed, which defines the problem to be solved, and in each subsequent phase objectives are set and planning and evaluation is performed (Cooper & Press, 1995). Seemingly the four phases resemble phase 2a, 2b, 2c and 3 in figure 3.2.2.2.

Nevertheless, when looking at different (external) process models, it seems as if some of the process models are ‘trying’ to transfer the internal problem-solving logic to the overall strategic level and consequently mixing the two perspectives. This may be seen as an attempt to support the internal task oriented processes with an overall structure. As an example of this, the industrial design consultancy IDEO describes their (external) process model with the following five stages (in Beim & Mossin, 2004, author’s translation):

1. Understand key aspects impacting project success
2. Observe end-users in relevant context
3. Visualise concepts
4. Evaluate/Refine different scenarios, and

Figure A1.2: The external productive process of design
5. Implement

Seemingly this corresponds to stage 2-5 in the internal creative process of design in figure A1.1 even though it is formulated as an external process model. Thus the distinction may not be so clear-cut.

Accordingly, Cooper & Press (1995:42) state that the perspective on the design process is determined by the size of the company, the complexity of the task and the corporate culture. The stages in the external process models can, on a meso-level, include various different activities, which aim to stimulate the internal problem solving process. However, this external (project) process may again be a part of a greater cooperate business strategy or process and thus the definition of the ‘external’ process becomes very comparative. The design process model for a traditional craftsman designing a single artefact would probably, unknowingly, be the internal creative process of design, whereas a large global building component supplier may use an explicit formulated “best-practice”, external process model formulated by business consultants.

An example of a process model, which sub-divides the external process stage, concept design, into internal process-stages, is shown below:

![Figure A1.3: The conceptual design framework model (Macmillan et al, 2002)](image)

In figure A1.3, the “Interpret” phase may correspond to the first three steps in the internal creative process of design, the “Develop” stage may correspond to step four and finally the “Diverge”, “Transform” and “Converge” stage may correspond to step 5 in the internal creative process of design.
However, even though this difference in process perspective is a relevant (academic) problem when comparing different process models, it may not be a problem when looking at a specific company, if employees understand the level on which the specific process model is meant to operate. On the other hand, the above discussion is practical relevant in the sense that it may illustrate a key reason for formulating a common construction process model like those shown in figure 3.2.2.1; the multiple companies involved in a construction project needs to get their company specific process models aligned towards the overall project process through a common framework. However, the diversity of company specific process models in relation to company size and culture may also be a key reason why it is difficult to make the common framework work at a more specific level.

Stage gates

As an example of another design process model, Blyth & Worthington (2001) have formulated the following project stages (author’s reproduction and shading):

![Stage gates diagram](Figure A1.4: Construction design process model by Blyth & Worthington, 2001)

The three overall phases; pre-project, project and post-project, correspond to stage 1, 2 and 4 in figure 3.2.2.2, thus leaving out the construction phase. The shading (made by the author) shows the recurring reviews of preceding phases, which seems to be a common feature in (contemporary) phase models. This may reflect inspiration from R. G. Coopers (1993) New Product Development (NPD) Stage-gate® approach, which was briefly touched upon in the description of the GDCPP.

---

42 In figure 3.2.2.1 item 14: Quality assurance and follow up on performance metrics, was repeated in many of the sub-phases in the generic process models.
The Stage-gate® process has been quite influential and is often referred to within this field of research (e.g. Tzortzopoulos, 2004, Beim & Mossin, 2004; Winch & Carr, 2001; Kagioglou et al, 2000). Coopers Generic Stage-Gate New Product Process is shown in figure A1.5:

![Coopers Generic Stage-Gate New Product Process](image)

Figure A1.5: Coopers Generic Stage-Gate New Product Process (Cooper, 1993)

The idea is to perform a quality review of deliverables at predefined “gates” in the project process and make a go/kill decision (based on predefined criteria) as to whether the project is ready to proceed into the next phase (Cooper, 1993). According to Cooper (1993), this creates more focus in the product development process, because not only do the gates serve as quality control check points, they also eradicates poor projects and makes sure that scarce resources are spent on viable projects (this should of course be seen within the context of manufacturing and multiple development programs). Reviews can be performed in various ways, which are more or less extensive and formal. Checklists/metrics can be used and evaluation meetings can be held, but a simple question can also stimulate reassessment and improvements. As an example Macmillan et al (2002:178) describe how asking the question: ‘Is the team aware of the client’s priorities among competing objectives’ at the end of phase 1 in figure A1.3 (Specify the business need) is used as a gate before entering the ‘Assessing the requirements’ phase. Apart from the stage-gates® the phases shown in figure A1.5 do not seem to differ significantly from what has been presented previously in this chapter.

The Toyota product development process
Toyota is capable of delivering new products to market faster than most of their competitors and for this reason researchers have started to analyze not only Toyotas well-renewed lean production system, but also their product development process. However, the following description is confined to a brief introduction to the phases of the Toyota PD system and some principles, which seems relevant within the present discussion of process descriptions (A more detailed review of
lean product development is provided in chapter 5.5). Thus, in opposition to Cooper’s Stage-Gate approach, Morgan & Liker (2006) point out – based on their study of Toyota – that stage-gates can be a potential barrier to the creation of “flow” in the development process, because gates and milestones courses fluctuation in work (large batches of information) (Morgan & Liker, 2006). Low batch size is a key lean principle and more loosely formulated, Morgan & Liker (2006:58) describes Toyota’s early design process with the following bullet points:

1. Defining a “design space” or system requirements
2. Creating multiple design and process alternatives (or solutions) based on standards (including common construction sections)
3. Quick testing and program objectives, analyzing each alternative’s impact on cost, quality, and performance
4. Rigorously honing in on the essential characteristics of each alternative
5. Combining characteristics across alternatives
6. Focusing energy and effort toward a single design and process solution

In this process emphasis is on assessing multiple alternatives simultaneously (set-based engineering) to gradually qualify a single design and (manufacturing) process solution, where compatibility comes before completion of individual design tasks (Morgan & Liker, 2006). This differs from most process models, which usually do not encourage generation of alternative concepts (Macmillan et al, 2002). Also, styling, engineering and manufacturing considerations are equally weighted, but (formally) subordinated to “customer value”. So, in line with the “teamwork agenda” promoted in the new GDCPP and IPD models presented earlier, the Toyota process is somewhat different in comparison to traditional construction processes, where architectural design comes before engineering and production related considerations.

One may also notice how Morgan & Liker (2006) avoids a cook-book, idealized process model, but instead suggests a set of principles and cultural characteristics, which seemingly makes Toyota successful – this corresponds with the ideal of values-based management (as described in chapter 5.4). One Toyota principle is the well known continuous reflection and improvement (kaizen) of standards and therefore it would also seem strange to have a “static”, standard process model. Accordingly, Sobek et al (1998) describe how Toyota has an overall (low-detailed) standard process, whereas each functional division and their employees are responsible for their own sub-system standard processes and checklists, which
they continuously develop. Intense on-the-job training and socialization of young engineers adds to process standardisation and hard deadlines keeps the projects on track (Sobek et al, 1998). In comparison, Sobek et al (1998) describes how an attempt to implement a centralized, highly detailed PD process model has failed at General Motors. In continuation of this, the underlying assumptions regarding process models will briefly be discussed below.

Concluding comments

Process descriptions differ in perspective and level of detailing, which also depends on whether they are meant as “to-be” (generic) process models or “as-is” process maps. The latter tends to be more detailed in description than the former. Another feature to consider, when comparing process models, is whether the descriptions represent one-off, multi-organisational project processes or “in-house” company specific, recurring processes. Distinction can also be made between: (1) company or project oriented external productive processes (of design) and (2) task-oriented internal creative processes (of design).

It seems that the potential “generic applicability” or ability to transfer models or maps is dependent on the parameters of model complexity (detailing), task uniqueness, and setting/cultural uniqueness – assuming that increased uniqueness and complexity will decrease the likelihood of transferability of process descriptions. Looking at the construction process, with its unique products and one-off multi-organisations, all parameters seems to work against the idea of (detailed) process models.

In continuation of this, it should be noted, that successful adoption of process models is likely to depend on the implementation approach (Tzortzopoulos et al, 2007) - not only the characteristic of the process model and the situation in which it is meant to operate. In addition, one may argue that it is more suitable to develop a methodology for developing project specific process descriptions, (without too much detail) and thus making it adaptable to the change process (Winch and Carr, 2001). Alternatively or supplementary a very overall process model can be used as a basis for tailoring a project specific process. Formoso et al (2002) describe how this indeed is possible. The process model can then be understood as a media for continuous communication and discussion about the process to improve working practice and “alignment” of expectations regarding deliverables among the parties involved – not as a standard process for optimization. Accordingly, Macmillan et al (2002) describe how the framework presented in figure A1.3, was
used to map the iterations in the design process, which afterwards was presented to the designers to stimulate reflection.
Appendix 2: Function Analysis System Technique (FAST)

Function analysis is the basis for the development of Value Engineering as a profession. Thus in a book by Snodgrass & Kasi (1986) value analysis is considered as a synonym to VE. In general two versions of function analysis can be applied (Snodgrass & Kasi, 1986), which have similar steps but different focus; the traditional approach called the Technical Function Analysis System Technique (Technical FAST) and a more customer oriented approach called Task Function Analysis System Technique (Task FAST). The Technical FAST represents a part or component of an object, whereas the Task FAST describes the object as a whole with specific emphasis on functions in the view of the customer (Snodgrass & Kasi, 1986).

Information phase

Within the framework of the ‘job plan’ (item 2-6, see chapter 5.3), first step in both approaches is to identify the “functions” of a product, component or process by asking the question “what does it do?” Traditionally it should be answered with one or more functions each consisting of a two word definition – a verb and a noun – such as “transfer force” and “reflect light” etc. In Technical FAST, this brainstorm would typically be structured in a sheet listing each sub-component or sub-activity of the study object (which is usually a sub-component of a larger object) and its associated functions down to the smallest screw (Snodgrass & Kasi, 1986).

The second step of the information phase is then to create a critical path of 5-6 essential functions which consists of one ‘higher order’ function, one ‘basic function’, two or three ‘required secondary functions’ and a ‘causative function’. These must relate to each other in a “how-why”-sequence. Thus, going from the left to right, each function in the critical path must answer the question “how?”, whereas they must also answer the question “why?” if one reads in the opposite direction (Snodgrass & Kasi, 1986). Accordingly, when looking at a work process for constructing a concrete column, the critical path could be (Snodgrass & Kasi, 1986:60):

\[
\text{Construct column} \leftrightarrow \text{Cast concrete} \leftrightarrow \text{Encase concrete} \leftrightarrow \text{Construct forms} \leftrightarrow \text{etc.}
\]

Asking “why?” and “how?” when brainstorming may also help identifying various functions. The idea is that moving up to a ‘higher order function’ by asking the question “why?” several times will increase understanding of the object being studied and stimulate more creative ideas to the question “how?” Nevertheless, initially focus should be directed towards understanding the phenomenon.
Technical FAST

In the Technical FAST, the functions are structured and displayed according to figure A2.1 (step 3). It can be seen that apart from the critical path, three other categories are used for the remaining functions: (1) ‘Design objectives’ (2) ‘All the time functions’ and (3) function that happen ‘at the same time’ or are ‘caused by’ the critical path functions. In addition two scope lines are introduced separating the ‘higher order function’ and the ‘causative function’ from the rest of the critical path, which is the object of investigation.

Figure A2.1: Technical FAST (Snodgrass & Kasi, 1986:60)

An example from one of the case studies, where an acoustical ceiling is reviewed, is shown below to illustrate the meaning of the different categories in the FAST diagram.

The fourth step is to distribute the costs of the product to each of the functions. Thus all costs of materials or manufacturing processes, which for example relate to ‘resist corrosion’, are assigned to this function. An example from one of the case-studies is provided below (figure A2.2).

The cost of all materials (or manufacturing processes) for the whole component divided by the costs of materials (or manufacturing processes) which relate to the critical path,

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43 The example actually a combination of a technical and customer oriented FAST
defines the value index. From experience, cost reductions can be made if this number exceeds 1.5 (Snodgrass & Kasi, 1986:80).

Thus, by rigorously investigating the functions of each part of the object and understanding the critical path and associated costs, the FAST diagram forms the basis for creativity (next step in the job plan) in relation to alternative materials or processes to accommodate the various functions. The extensive approach entitles that about seventy percent of the 40 hour job plan is spent on the ‘information gathering’ phase (Snodgrass & Kasi, 1986).

![FAST diagram for acoustical ceiling](Cathedral Hill Hospital, 2009)

Figure A2.2: FAST diagram for acoustical ceiling (Cathedral Hill Hospital, 2009)
Customer oriented Task FAST

In the customer oriented Task FAST approach, the second step of the information phase (after having brainstormed on various functions) is to categorize the functions as ‘basic’ or ‘supporting functions’, where the basic functions are those which make the product ‘work’ (similar to critical path) and supporting functions are (often) those which ‘sell’ the product (Snodgrass & Kasi, 1986). The latter category of functions can often be subdivided under the following four headings: Assure Convenience, Assure Dependability, Satisfy User (Customer), Attract User (Customer) (Snodgrass & Kasi, 1986).

The third step it to structure and display a hierarchy of functions within the framework of the Task FAST diagram shown below (figure A2.4). This diagram has great similarity with the value trees presented earlier. The Task FAST is established by identifying the overall task and asking “how?” and “why?” to organize the remaining functions (and maybe add or change functions, if the questions cannot be answered appropriately).

If the study-object ‘works’ within a larger system, a flow chart of the system processes may be created as a basis for identifying and categorizing functions (Snodgrass & Kasi, 1986:176). As with the technical FAST the fourth step is to distribute costs on the vari-

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44 The process flow chart is similar to “value stream mapping”, which was briefly described in chapter 5.5.

---

Table A2.3: Distribution of cost to functions (Cathedral Hill Hospital, 2009)
ous functions. The idea is to highlight unnecessary functions or expensive supporting functions, which can either be eliminated or be provided for less cost.

Figure A2.4: Customer oriented FAST diagram

As an example, Snodgrass & Kasi (1986) describe how the distribution of cost to functions for a concrete bridge section, showed that some of the thickness of the slab was only there to protect the reinforcing bars against corrosion, therefore a percentage of the cost was assigned to the function “extend (structure) life”, whereas another percentage of the cost was assigned to the function “support vehicles”. In addition, because the same bridge also had two lanes for pedestrians, a percentage of the cost was assigned to the function “support pedestrians”. However, after the VE study, one pedestrian lane was deleted because it was not considered necessary under the given circumstances – other changes were made as well (Snodgrass & Kasi, 1986). Thus, the customer (if defined) can state what she is willing to spend on each function and if this does not match, with some of the function cost identified, it is called a “value mismatch”, which should trigger either a deletion of the function or a search for alternative, cheaper solutions (Snodgrass & Kasi, 1986). A supplementary way to focus the improvement effort is to adopt the Pareto principle, which states that 80 percent of the costs are associated with 20 percent of the functions (Snodgrass & Kasi, 1986:270). Accordingly, to list the func-
tions with the highest costs in descending order and only focus on those, which make up about 80 percent of the overall costs, is a way to delimit the scope of the subsequent creative phase. An example from the case-study is shown below, where it seemed that savings should be sought for within the function “minimize sensory distraction”.

<table>
<thead>
<tr>
<th>Functions</th>
<th>Percentage</th>
<th>Cost</th>
<th>Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Establish Ceiling Plane</td>
<td>18.7%</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>2. Conceal Systems</td>
<td>18.5%</td>
<td>High</td>
<td>High</td>
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<tr>
<td>3. Resist Lateral Movement</td>
<td>12.7%</td>
<td>High</td>
<td>High</td>
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<tr>
<td>4. Minimize sensory Distraction</td>
<td>10.9%</td>
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<td>5. Improve Wayfinding</td>
<td>9.3%</td>
<td>Med</td>
<td>Med</td>
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<tr>
<td>6. Resist Gravity</td>
<td>9.2%</td>
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<td>7. Project Professional Image</td>
<td>8.7%</td>
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<td>8. Improve Visual Appeal</td>
<td>5.4%</td>
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<td>9. Conceal Irregularity</td>
<td>3.2%</td>
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<td>Med</td>
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<td>10. Span Obstructions</td>
<td>1.8%</td>
<td>Low</td>
<td>Med</td>
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<tr>
<td>11. Confine Infection</td>
<td>0.6%</td>
<td>Low</td>
<td>High</td>
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<tr>
<td>12. Install Acoustical Ceiling (undefined)</td>
<td>0.5%</td>
<td>Low</td>
<td>Med</td>
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<tr>
<td>13. Conceal Edgecut</td>
<td>0.5%</td>
<td>Low</td>
<td>Med</td>
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*Table A2.5: Cost of functions versus ‘worth’ from the perspective of the customer (Cathedral Hill Hospital, 2009)*

The job plan after the information phase

The creativity phase (or speculation phase) takes it outset in the functions which have been selected for further consideration in the information phase (where high cost and/or value “mismatch” are identified). Snodgrass & Kasi (1986) argue that instead of (or supplementary to) refining existing solutions, focus should (also) be on functions in order to produce truly innovative ideas. Various alternative solutions to the functions are considered, but also ‘alternative’ functions are considered. Thus, the initial identified functions or design criteria may be reconsidered or reformulated. As an example, Snodgrass & Kasi (1986:279) describe how the function “maintain traffic” in a highway reconstruction project could be reformulated as “discourage traffic” and the (opposing) function “ease construction” could be reformulated as “simplify construction”. This produced alternative solutions with substantial savings (within the terminology of the experiential learning perspective, these are examples of ‘reframing’).

Snodgrass & Kasi (1986) describe various forms for evaluation, where different solutions are evaluated against different criteria (cost, time, probability of implementation success etc.), which can be weighted by importance. After evaluation, the ideas are developed for feasibility and presented to management. If acceptance is achieved implementation is pursued. However, according to Snodgrass & Kasi (1986) this is often where the effort breaks down because of lack of support from essential stakeholders, who were not included in the VE study.
Appendix 3: Interview guide – Social Housing (Case-study 1)

Opening questions to clarify the concept and the context

1. In order to understand your perspective, could you briefly describe your professional background?
   (Hermeneutic approach – aims to understand context. It is also a way to open up the interviewee)

2. Can you, with your own words, describe the purpose of the workshop model?
   (To understand the participant’s interpretation of the workshop model (Kvale, 1994:107))

3. How would you describe the concept of the workshop model in general terms?
   (To understand the participant’s interpretation of the workshop model. What aspects have made an impression? It also gives the interviewee a chance to recall the workshop model).

4. Can you, with your own words, describe what ‘value’ is?
   (To understand the participant’s definition and meaning. To prove or disprove the hypothesis that the level of abstraction is a bit too high for the workshop participants)

The workshop participant’s experience of the workshop model and its possible effects on the project

5. How did you experience the workshop process in this particular project?
   (A descriptive opening question (Kvale, 1994:124))

6. Did the workshop model have an effect on the project? If so, could you provide some practical examples?
   (cf. purpose of the interview)

7. Was there anything in the workshop process that did not work? Were there any aspects of the workshop model that were unnecessary or had a downright negative effect? If so, could you provide some practical examples?
   (To generate examples of unintended effects of the workshop model in relation to desirable conceptual effects)

8. Did the workshop model contribute with something new in comparison to a ‘normal’ project?
   (Rephrasing the effect question)

   Actor perspective

9. Did the workshop model have an effect on your own work on this project?
   (Effect question, the participant’s personal interest)

10. How did you perceive your role in the workshop meetings?
    (To test hypothesis that the workshop model modifies traditional distribution of roles)

11. Is this role any different in comparison with other projects?
12. Did you use the value-tree and the minutes of the workshop meetings in your work on the project?
   (Rephrasing of the effect question)

13. On the last workshop meeting it was agreed to have an additional workshop to plan the design process in accordance with construction site production. This was never realized. Do you know why?
   (To explore this particular deviation from plan)

General applicability
14. On what type of projects would the workshop model be best suited?
   (Range of use of the workshop model)

15. Can you imagine projects where the workshop model would be ill-suited?
   (Range of use of the workshop model. It also gives the interviewee a chance to ‘shift’ his or her critique to a hypothetical case, which can be more pleasant and give rise to more critique).

Change of viewpoint
16. Does your organization have any interest in engaging in a workshop process again?
   Why/why not?
   (Gives the opportunity to make a critique from another viewpoint, thus shifting the critique away from the interviewee. It also explores the different layers of interest in a project)

17. Are you personally motivated to engage in a workshop process again?
   (Explores the motives of the specific actor – the different layers of interest in a project)

18. Could you have (other) reasons for not supporting the application of the workshop model on a future project?
   (Open question to test the hypothesis that e.g. the client can feel manipulated by the workshop model or feel constrained by the early statements he is ‘forced’ to make or that the architect feels that his artistic latitude is constrained etc.)

19. Do you think that the other workshop participants agree with your opinion of the workshop model?
   (Gives the opportunity to make a critique from another viewpoint, thus shifting the critique away from the interviewee)

20. How do you think the workshop model will go down with the Danish construction industry?
   (Gives the opportunity to make a critique from another viewpoint, thus shifting the critique away from the interviewee)

General evaluation of the project and exploration of (other) causes to its outcome

21. Has this been a good project? Why / why not?
   (What is the interviewee’s general perception of the project? – It can bias his/her perception of the workshop model. What other central aspects have influenced the project?)

22. What has in your opinion been decisive for the project process and outcome?
(What (other) central aspects have influenced the project?)

23. How do you characterize success and what is the most common cause for success on construction projects?
   (What is the prevalent storyline for success?)

24. Was the purpose of the workshop model achieved on this project? If so, was it because of the workshop model?
   (Effect of the workshop model. The workshop model in light of different perceptions of success).

25. Has the project resulted in a good product?
   (Specific judgment of product value)

26. How could the workshop model be improved?
   (Summarizing question and a positive way of provoking indirect critique)

Specific questions to the client representatives:

27. Did you feel that there was a risk of being held responsible for early statements about value (the risk of manipulation)
   (cf. pre-understanding)

28. Did you feel capable of expressing your values?
   (cf. pre-understanding)

29. Did your values change during the process?
   (cf. pre-understanding)

Some more direct question about some of the hypothesis/pre-understandings may be asked at the end of the interview (the critical questions put forward in the method chapter – see also question 18). Of cause these would be leading questions, but they can still produce some valuable reactions on the hypothesis.
Appendix 4: TVD - Mapping of changes (Case-study 3)

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of Change</th>
<th>Description of change in TVD chart</th>
<th>Sub-group name</th>
<th>Cluster group</th>
<th>Detailed description of change (according to interviewees)</th>
<th>Interview recording time (roughly)</th>
<th>Comments to cost impact (by Mikael)</th>
<th>Prime reason for change</th>
<th>2nd level of reason for change</th>
<th>Related A3</th>
<th>Important advantages (according to A3)</th>
<th>Trade-off considerations (other alternatives)</th>
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<th>Link to other change no.</th>
<th>Related As</th>
<th>Level of reason for change</th>
<th>Comments to cost impact (for Mike)</th>
<th>Description of change in YOA chart</th>
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**Figure:**

- Diagram showing relationship between variables and change points.
- Key notes and annotations: 
  - Key notes: (1) Relevant factors and assumptions.
  - Annotations: (2) Important considerations.

**Footnotes:**

- Footnote 1: Additional data sources.
- Footnote 2: Clarification on methodology.
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<th>Cluster group</th>
<th>Stage group name</th>
<th>Comments to cost impact (May Mikael)</th>
<th>Phase reasons for change</th>
<th>Prioritization of change (MICD)</th>
<th>Detailed description of change becoming</th>
<th>Related</th>
<th>Total cost considerations (cash)</th>
<th>Implementation decisions according to (MICD)</th>
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<th>Link to other change No.</th>
<th>Trade-offs/considerations other</th>
<th>Important documents (according to AS)</th>
<th>Related AS</th>
<th>2nd level of reason for change</th>
<th>Prime reason for change</th>
<th>Comments to cost impact (if relevant)</th>
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**Note:** The image contains a table with columns and rows, but the specific content is not legible in the provided image. The table seems to be used for tracking or documenting changes, possibly within a software development or project management context. The columns include various categories such as link to other change, trade-offs, important documents, related AS, and others. The rows under these columns are not clearly visible due to the quality of the image.
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*Note: The table contains placeholders for data entries.*
Appendix 5: Interview guide – Hospital (Case-study 3)

Overall Purposes:

A. To provide accounts of the effects of target value design and its usefulness in construction projects based on the hypothesis that designing to targets can facilitate innovation and cost reduction (greater value for a given cost or target value for less cost) on construction projects.

B. To explore the dynamics of change within a construction project in relation to a theoretical understanding of value and specifically the creation of ‘client value’ within a target value design environment.

Opening questions

1. In order to understand your perspective, could you briefly describe your professional background and function on this project?
   (Hermeneutic approach – aims to understand context. It is also a way to open up the interviewee)

2. What is your general experience of the Cathedral Hill project process?
   (A descriptive opening question (Kvale, 1996))

Tracking of changes and their reasons

3. Starting from the graphical overview of the development in cost estimate, could you tell the ‘story’ of the changes which have occurred on the project – how did they emerge, what were their impact?
   (To get a structured account on the changes which have occurred on the project)

4. Are there any other notable changes which are not represented on the graphical overview? If so, what is the ‘story’ about these changes?

5. Would you characterize any of these changes as ‘innovative’?
   (Re purpose A)

6. How do the changes relate to the stated client values?
   (Re purpose B)

The interviewees understanding of the concept

7. Have you had any experience with target value design prior to this project?
   (To understand context/background)

8. Can you, with your own words, describe the purpose of target value design?
   (To understand the participant’s interpretation of the phenomenon (Kvale, 1996))
Effects of target costing

9. Has target value design affected this project? If so, in what way?
(Re purpose A)

10. Would these changes not have occurred anyway?
(Re purpose A)

11. What is in your opinion the key distinguishing features of target value design?
(Re purpose A)

Problems, critique and general applicability

12. Have there been any barriers or problems in relation to implementation of target value design?
(Re purpose A)

13. Can you think of any downsides to target value design?
(Re purpose A)

14. Have any changes or tradeoffs occurred which you disapprove of? If so, why?
(Re purpose B)

15. Does your corporate organization have interest in engaging in a target value design process again?
(The question gives the opportunity to make a critique from another viewpoint, thus shifting the critique away from the interviewee. It also explores the different layers of interest in a project and the general usefulness of the concept – re purpose A and B)

16. Are you personally motivated to engage in a target value design process again? What’s in it for you?
(Re purpose B)

17. Do you think that the other participants support the project changes and tradeoffs which have occurred?
(Re purpose B. Gives the opportunity to make a critique from another viewpoint, thus shifting the critique away from the interviewee)

18. What do you think is the perception of the target value design concept in the construction industry in general? Are there any opponents?
(Re purpose A and B. Gives the opportunity to make a critique from another viewpoint, thus shifting the critique away from the interviewee)

19. Is target value design applicable to all kinds of construction projects? Or is it most suitable for a certain kind of project?
(May there be specific premises which determine the usefulness and effect of target value design)

General evaluation of the project (so far) and exploration of (other) causes to its outcome

20. Has this been a good project so far? Why/why not?
(What is the interviewee’s general perception of the project? – It can bias his/her perception of the target value design concept. What other central aspects have influenced the project?)

21. **What has in your opinion been decisive for the project process and outcome at this point?**
   (What (other) central aspects have influenced the project?)

22. **How do you characterize success and what is the most common cause for success on construction projects?**
   (What is the prevalent storyline for success?)

23. **Has the purpose of the target value design concept been achieved on this project so far?**
   *If so, is it because of the target value design concept?*
   (Target Costing in light of the perception of ‘success’).

24. **How could the target value design method be improved?**
   (Summarizing question and a positive way of provoking indirect critique)

25. **What is the most common reason for making changes in design?**

**Supplementary questions**

26. **Ask how the architects relate to client value.**

27. **How are user requests managed?**
Appendix 6: Value Statement - Hospital (Case-study 3)

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Value Statement

THE VALUE STATEMENT

The intent of the Value Model is to define a holistic framework by which all the aspects that drive value in the Cathedral Hill Hospital project can be studied and evaluated. This preliminary set of Core Values seeks to communicate the array of perspectives that must be addressed in a successful design – by combining values expressed by Users and Stakeholders with the design principles developed by the design and construction professionals who, together, make up the Integrated Project Team for the Cathedral Hill Hospital.

- The Patient and Family Experience
  - Patient-focused Care: design that encompasses the needs of the patient, the patient's family and the patient's care-givers
  - Accessibility and Way-finding: providing ease of access to all spaces of the hospital and clarity that ensures “no wrong door” for patients, visitors and staff
  - Comfortable and Varied Interactive Environments: interior and building design that engages patients, visitors, and staff with experiences that support the healing and work environment.
  - “One-stop Shop”: concept for patient care that alleviates the unnecessary movements of patients through the hospital

- Operational Considerations
  - Program Fit: a building plan that promotes departmental efficiency as well as realizes target efficiencies of building gross area
  - Physician and Staff-friendly: spaces and organization of spaces that provide a comfortable and easy-of-use work-place
  - Segregation of Public, Patient and Service: floor plan arrangements that provide separation of public circulation and staff functions
  - Balance of Flexibility and Efficiency: planning that recognizes optimal department operations as well as allows for change to accommodate evolving future models of care
  - Core Locations: planning that locates core support space and transportation elements for efficient use and function
  - Related Department Adjacencies: planning that seeks to minimize distances and increase sharing of support between functionally-related departments and services
  - Future Flexibility, Adaptability and Growth: planning that provide for strategic change and growth as needs and methods change over time

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Value Statement

- **Cost**
  - **Maximizing Resources**: improving the processes of planning, design, approval and construction, to minimize waste wherever feasible, and seek to remove redundancies in the same way that the hospital seeks operational efficiency
  - **Construction Costs**: minimize construction costs through "target-value" design and innovations in design as well as procurement
  - **Life-cycle Costs**: provide systems that provide high-value in operational costs as well as first cost

- **Constructability**
  - **OSHPD Review**: develop a review process that puts OSHPD as a "customer" to the documents developed for approval by the Integrated Project Delivery Team, seeking collaboration to the benefit of the overall schedule
  - **Seismic Criteria**: establish a structural approach that strives for the best value and performance of the building structure that ensures maximum safety as well as continued operations after a seismic event
  - **Building Systems Criteria**: develops approaches to building mechanical and electrical systems that are based on state-of-the-art technology as well as ease-of-operation for building maintenance staff

- **Environmental Criteria and Sustainability**
  - **Energy and Water Efficiency**: provide designs of systems and promote decisions that include energy-reducing features in all equipment used in the hospital
  - **Maximizing Site Utilization**: develop an overall design approach that seeks to utilize all the available area of the site, efficiently and economically
  - **Access to Natural Light**: provide designs that, as much as possible, bring natural light to all occupied areas of the hospital
  - **Public Transportation**: promote the use of public transportation by all users of the hospital through coordination with City transportation systems along with design of accommodations and ease-of-access from points of arrival

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- **Urban Design**
  
  - **Alignment with City Planning Goals**: develop a dialogue with City officials that ensure common goals are achieved by the building's urban plan and design.
  
  - **Respect for Neighbors**: seek to be a "good-neighbor" through design that is sensitive to adjacent neighborhoods on all sides of the hospital.
  
  - **Architectural Significance**: provide an exterior design that establishes a building character that is recognizable for its design excellence as well as timeless in its urban context.
  
  - **Center of Excellence**: provide an integrated design that promotes the hospital as a center for the highest professional healthcare service.
  
  - **Distinct Identities**: create an distinct environment for patients that caters to the unique needs of a Women’s and Children’s hospital as well as the Acute Care.
The thesis provides an answer to the following question: *How should construction design processes be managed with the objective of maximizing client and user value?* The examiners wrote: “The thesis gives an original and important contribution to both research and practice... The case studies give a rarely seen detailed insight into the early stages of building projects... Particular case 1 and case 3 represents very interesting studies of state-of-the-art construction management methods... The research gives convincing evidence of the importance of the social process in the design development of building projects and provides an important critical perspective on the rational view of design development, which many methods of project and value management are based upon.”