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Incentive-based Engineering Contracts in Construction Projects

A Case Study Assessing the Alignment of
Incentives through Integrated Project
Delivery using a General Partnership with a
Shared Liability

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Trondheim, June 2018

Preface

This thesis is the outcome of the course *TPK4920 Project and Quality Management, Master's Thesis* and concludes the 5 year Mechanical Engineering master programme at the Norwegian University of Science and Technology. The thesis is written during the 10th and last semester and amounts to a full 30 ECTS. The thesis is considered a continuation of *TPK4520 Project and Quality Management, Specialization Project* that was written last fall and builds on the theory and findings of that specialization project. As part of the fundament for the thesis and its problem statement, the author got access to a case study and its participants for conducting interviews and other qualitative research. The case study was discovered by the author during the interviews that were part of the specialization project last fall and was considered an interesting approach to further explore the different problem statements connected to the topic.

When choosing the specialization topic for the project last fall, the assignment on *Incentive-based Engineering Contracts* caught my attention. Well executed projects, be it constructing a building or implementing an IT-system at your workplace, relies on several factors for success; planning, managing, analyzing, executing, but also collaborating. Good collaboration between the different parties involved in a project should not be underestimated. The contract strategy is a key component of the overall project strategy, and the contract in itself is an important tool. The more interesting part of the project contracts is how they could be used, or rather *should* be used, to facilitate collaboration between the different parties of the project. After touching the surface of the theory and talking to practitioners in the specialization project, it became even more interesting to research the topics further and get a better perspective through analyzing a case project that is trying to solve some of the traditional issues of construction projects through innovative ways of organizing and incentivizing the project participants. It is surely an interesting and important topic, and I hope that the master thesis can help me and others to better understand the synergies within the construction project and the project organization, and understand better what incentivizes, motivates and inspires the participants so that construction projects can be more efficient.

I would like to thank Team Veidekke DA and especially Espen Stordal, the project manager, for letting me interview the consultants in their project team and for giving me access to various resources of the Ulven B2 project. I would also like to thank my supervisor Bjørn Andersen for all the help, guidance and support through this semester of writing this thesis.

Fredrik Sørum Thronæs

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Abstract

This thesis provides research on the contract strategy in construction projects, the effect of more integrated project delivery on the design phase of construction projects and more specifically the contract types that are used to compensate consultants providing engineering work in construction projects and their incentives. Building on a previous specialization project, this thesis aims to put some of the theory in context by analysing a case study which uses one approach of integrated project delivery. The purpose is to see whether such an approach to more integrated project delivery systems can help align the incentives in the contracts used towards consultants providing engineering work in the design phase of construction projects.

The thesis contains an extensive theoretical framework based on literature studies, where the contract strategy, contract designs and contract types used in construction projects are described. Furthermore, the theoretical framework describes some theory on incentives, including the principal-agent problem, transaction cost theory and their effect on construction contracts, relational contracting and integrated project delivery. Additionally, a case study involving an industrial housing project where the main-contractor consists of a general partnership with a shared liability is analysed. The general partnership integrates the contractors and consultants into one entity and uses a pool of shared gains/losses in conjunction with cost reimbursable contracts with upper price ceilings to compensate the partners. Five interviews with different consultants within this general partnership were conducted to provide qualitative data and give a practical perspective to the theory.

The study shows that the integration of the consultants and the contractor into one entity facilitates early integration in the design phase of the projects which allows for interdisciplinary collaboration and leads to innovative and rational solutions. The case project estimates a reduction in the construction costs by 20%, while maintaining the quality of the delivery. The interviews suggest that the shared gains/losses fail to provide sufficient alignment of the financial incentives in the cost reimbursable contracts. However, the overall collaboration clearly provides semi- and non-financial incentives which proves to make a substantial impact on the motivation and inspiration of the consultants. The thesis also indicates that the semi- and non-financial incentives may be underrated in the contractual context. The general partnership with a shared liability fits with what the literature describes as an “IPD-ish”-contract and follows many of the principles of integrated project delivery but fails to include the project owner in the collaboration. The ideal contract type for the consultants is the cost reimbursable contract without any price ceiling. Such a contract type would be practically impossible to implement because of the inherent misaligned incentives and thus provides too high a risk for the principal. However, integrated project delivery methods in various forms in addition to financial incentive schemas like the shared gains/losses with an adequate incentive intensity can help align these misaligned incentives in this contract type which might be a step towards the contract for the future.

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1 Introduction

Contracts governing engineering work supplied by engineering consultants are usually either based on a fixed price or payment by the hour. However, both contract types have issues in terms of the incentives they create; there is therefore an initiative among the research community and the industry to develop alternative contract formats that better align the incentives in the project.

Additionally, more integrated project delivery systems are emerging in the industry, where the project owner, contractors and consultants collaborate more closely together through various collaborative contracts or so called Integrated Project Delivery (IPD) contracts. This thesis will analyse the theoretical framework on contract strategy, integrated project delivery and contract types up against a case study where Team Veidekke DA uses a collaboration contract which integrates the contractors and consultants through a general partnership with a shared liability to deliver a housing project called the Ulven B2 project that is a part of a bigger industrial housing development in Oslo.

1.1 Background

The master thesis is considered a continuation of the specialization project the author wrote last semester, which was initially connected to a more comprehensive research project called *“Improvement of Engineering Work in Construction Projects”*, a collaboration project between NTNU and Prosjekt Norge.

1.1.1 Research initiative from Prosjekt Norge and NTNU

Both practitioners’ experience with engineering work in projects, conducted research projects (i.e. the PROBY-Project (Olsen, 2013) and the doctoral dissertation of Kai Haakon Kristensen (Kristensen and Norges Teknisk-Naturvitenskapelige Universitet, 2013)) and empirical studies using the 10-10 method developed by the Construction Industry Institute (CII) implies that the engineering/design work and its deliveries often constitutes a problem in construction projects. The research project is based on the hypothesis that a core problem related to the engineering work is due to the form of contract and form of compensation, more specifically the contract type, and the resulting incentives these provide. However, preliminary studies show that this may only be a part of the overall issue, and that the problems can be related to underlying issues like the organization of the stakeholders and the decision-making process as a whole.

The goal of the research project is to develop, implement and test improvements in the engineering work of construction projects by answering to the following problem statements:

- Define a consensual decision model (for construction and transportation projects) that represents a more detailed version of the currently applied project phase models and

which indicates when in the development of the project the different decisions on concepts, standards, methods, etc. are made.

- Define principles for when the different stakeholders should be involved in the development of the project, in relation to the decision model.
- Combine the principles from current contract types to possibly develop a “contract type for the future” to integrate the stakeholders in such a way that it benefits the project.
- Suggest possible types of compensation/remuneration for the engineering contracts that better aligns the incentives of the different stakeholders with regards to the engineering work.

It is especially the last two problem statements from the research project that created the basis for the specialization report of last semester and will be further addressed in this master thesis.

1.1.2 Specialization project from last semester

Before being able to suggest possible compensation formats that better align the incentives and develop a contract type for the future it was necessary to properly understand the current contract types and the theory behind them. Hence, the specialization project of last semester aimed to answer the following problem statements:

- What contract types are being used in the engineering/design phase of construction projects in the industry today, and what are their strengths and weaknesses for both consultant, contractor and project owner?
- What are the issues related to the incentives they create?
- Which possible incentives would be beneficial to implement in the contract design from the perspective of both the contractor and the consultants, as well as the project owner?

Additionally, the purpose of the specialization project was:

- To describe the theoretical fundament of the contract strategy as described in the literature, with a focus on the choice on contract type and how incentives can be used as an instrument.
- To find out which contract type is preferred by both contractor and project owner in different types of projects, by conducting interviews, and determine any possible issues.
- To identify strengths and weaknesses of the different contract types, for the different parties involved, by looking at the theory of contract strategy as well as the experiences from the different companies.
- To see if there are incentives that could be implemented in the contract designs that may benefit the overall project in terms of cost, time and scope.

The specialization project revealed that there are indeed mainly two contract types that are used towards consultants providing engineering work in the design phase of Norwegian construction projects, fixed price and hourly-rates based contracts. The literature describes several other contract types, and the theory suggests that the different contract types, particularly the extreme contract types of fixed price and cost reimbursable, creates misaligned incentives. The interviews also implied that there are misaligned incentives created in the two contract types used to hire consultants. The impact of the two contract types on the design phase is not clear, but there is an underlying premise in the contracts for a negative impact in both the project organization and later phases of the project. Key aspects of the theoretical framework, discussion and conclusions of the specialization project is included in this thesis to provide a complete basis for the research.

1.2 Purpose of the study

Building on the specialization project, this thesis aims to put some of the theory in context by analysing a case study which uses one approach of integrated project delivery. The purpose is to see whether such an approach to more integrated project delivery systems can help align the incentives in the contracts used towards consultants providing engineering work in the design phase of construction projects. The results from this thesis can hopefully contribute to the knowledge base on contract strategy and project delivery systems and provide information to the research initiative by Prosjekt Norge and NTNU.

While some of the theoretical framework of the specialization project of last semester is reiterated, additional theory on types of incentives, relational contracting, principal-agent theory and in particular integrated project delivery is presented and discussed up against qualitative data from interviews with various consultants involved in the case study at hand. This analysis will hopefully give some answers to whether or not an integrated project delivery system using a general partnership with shared liabilities can help align incentives in the contracts used towards consultants providing engineering work in the design phase of construction projects.

1.3 Problem statements

This thesis will extend the problem statements of the research initiative by Prosjekt Norge and NTNU, as well as the problem statements of the specialization project and fit them in the context of the case study. The case study uses one particular business structure in its integrated project delivery system, and the core element of the problem statements will revolve around how the incentives in the contract types used towards the consultants are influenced through this way of organizing.

Some problem statements that the thesis will address are:

- How are the incentives of consultants providing engineering work influenced by an integrated project delivery system?

- How can the compensation format or contract type be designed so that the incentives of the various stakeholders are better aligned with the overall project?
- What aspects of the contract or work environment motivates and incentivizes the consultants? What are their experiences with such a collaboration contract?
- Could an integrated project delivery contract, and in particular a contract based on a general partnership with shared liabilities as described in the case study, be a step towards a “contract for the future” in the construction industry?

1.4 Research questions

To break down the more comprehensive problem statements, four research questions have been formulated:

1. How can an integrated project delivery system using a general partnership with a shared liability help align the incentives in the contracts used towards consultants providing engineering work in the design phase of construction projects?
2. Which type of incentives are most important for consultants providing engineering work in the design phase of construction projects?
3. What contract type (compensation format) would be best suited towards consultants using this particular project delivery system?
4. Is a general partnership with a shared liability a suitable business structure for a more integrated project delivery?

1.5 Structure of the thesis

The first part of this report states the purpose and the research questions that the study tries to answer. The second part outlines the methodology used for the study, where both literature review and the interviews are explained. The third part of the report provides an extensive theoretical framework for the topics that will be used in the analysis, this includes the contract strategy, contract designs, contract types, as well as some theory on incentives and integrated project delivery. Additionally, relational contracting, the principal-agent theory, lean construction and the various business structures used in Norway are introduced. The fourth part presents the case study of the Ulven B2 project, part of the Ulven development in Oslo, that is delivered by Team Veidekke DA. The fifth part presents the summary from the interviews conducted with the various consultants that are part of Team Veidekke DA. The sixth part provides a discussion on the theory from the literature and the results from the interviews, trying to answer the problem statements and research questions in relation to the results. The seventh and last part is a conclusion of the thesis, where key findings of the study are presented.

1.6 Some remarks

The contract strategy, contract types and the discussion on how incentives are aligned in the contracts are a concern for all projects. Furthermore, considering the background and the scope of the thesis, most of the discussion and conclusions will be limited to construction projects and in particular Norwegian housing projects considering the case study at hand. However, the information and findings from this thesis may apply to other types of projects as well.

The literature uses a broad set of terminology depending on language and country within this topic. Hence, to avoid any confusion:

- The term *Project Owner* will be used for referring to the construction client, proprietor, owner, buyer, etc.
- The term *Contractor* will be used for referring to the construction agent, supplier, seller, etc.
- The term *Consultant* will be used for referring to the designer, architect, engineer, seller, etc.
- The term *Contract Type* is sometimes used interchangeably in the literature to both the compensation format to each contractor and the contract design of the whole project. In this study, the term contract type refers to the compensation format rather than the contract design. For instance; a fixed price contract is a contract type, while a design-build contract is a contract design.
- The term *Main-Contractor* is used for the contractor that is involved in design-build contract designs, where the project owner is the other part.

Furthermore, the international literature and the Norwegian literature mixes some of the terms and definitions on both contract types and contract designs. Hence, some of the contract types or contract designs presented in the theoretical framework may use a different terminology than what some are used to depending on which language you are using. However, they are explained thoroughly, so that the reader should be able to understand which type or design is in question.

2 Methodology

2.1 Research method

The topic of this specialization project overlaps different fields of study; engineering, law, economics and psychology. The topic could arguable be best described as within the management field of study in particular, and this affects the choice of research method when trying to expand the knowledge on the topic.

2.1.1 The nature of management research

According to Easterby-Smith et al. (2008), there are three features of management research that are continuously discussed; the tension between qualitative or quantitative methods, the debate about whether management research should lead to developments in academic theory or lead to solutions of practical problems, and the political issues that arises from doing research on formal organizations that have distinct boundaries controlled from within.

Furthermore, management research is distinctive through three additional features (Easterby-Smith et al., 2008):

- The research can be considered *eclectic*. This means that the research often has to adopt a trans-disciplinary approach and draw knowledge from different disciplines and fields of study, compared to the approach of looking at one discipline.
- Managers tend to be highly educated, thus they would be more likely to appreciate the value of research-based knowledge. This might affect the objectivity of the research.
- There is often an expectation that the research will lead to action. This might lead to conflicts of interests for the researcher, when the organizations that offer access and support might expect something in return.

Tranfield et al. (2003) discusses the nature of management research, which includes several perspectives on the ontological status of the management field of study. In his paper he highlights different arguments from various sources that discuss whether management science should be regarded as a practically or theoretically oriented science. For example, Aken (2004) argues that the management field of study could be viewed as a design science, much like the engineering field of study. Also, during the literature review on incentive theory and the principal-agent problem the paper "*Organization Theory and Methodology*" written by Jensen (1983) came to mind. He discusses the challenges in relation to normative and positive theories, the importance of the choice of tautologies and definitions to the research effort, the nature of evidence and the role of mathematics. In particular he discusses these aspects in relation to the principal-agent problem and the two agency literatures, where there are both strong and weak points to the two approaches of describing the theory and the usefulness of preference, stochastic structure and information structure in explaining observed contracting practises.

2.1.2 Research paradigm

The research method can follow different paradigms for the way in which it obtains valid knowledge. The research paradigm depends on the ontology and epistemological position the researcher chooses to use. According to O'Gorman and MacIntosh (2015), ontological assumptions can be broadly divided into two fundamental configurations; *objective* and *subjective*. Easterby-Smith et al. (2008) describes these two ontological configurations as *realism* and *relativism*, and expands it into four different ontologies; *realism*, *internal realism*, *relativism* and *nominalism* as shown in table 1.

Ontology	Realism	Internal Realism	Relativism	Nominalism
Truth	Singe truth	Truth exists, but is obscure	There are many 'truths'	There is no truth
Facts	Facts exist and can be revealed	Facts are concrete, but cannot be accessed directly	Facts depend on viewpoint of observer	Facts are all human creation

Table 1: The four different ontologies (Easterby-Smith et al., 2008)

There are four main distinctive paradigms, or *epistemological positions* that you can assume when obtaining knowledge; *positivist*, *critical realist*, *action research* and *interpretivist* (O'Gorman and MacIntosh, 2015). Easterby-Smith et al. (2008) has labelled these same epistemological positions as *strong positivism*, *positivism*, *constructionism*, and *strong constructionism* respectively, and listed the methodological implications of the correspondence of ontology and epistemology as shown in table 2:

Ontologies	Realism	Internal realism	Relativism	Nominalism
Epistemology	Strong positivism	Positivism	Constructionism	Strong constructionism
Methodology				
Aims	Discovery	Exposure	Convergence	Invention
Starting points	Hypotheses	Propositions	Questions	Critique
Designs	Experiment	Large surveys: multi-cases	Cases and surveys	Engagement and reflexivity
Data types	Numbers and facts	Numbers and words	Words and numbers	Discourse and experiences
Analysis/ interpretation	Verification/ falsification	Correlation and regression	Triangulation and comparison	Sense-making: understanding
Outcomes	Confirmation of theories	Theory testing and generation	Theory generation	New insights and action

Table 2: Methodological implications of different research paradigms (Easterby-Smith et al., 2008)

2.1.3 Data gathering

The research can be either quantitative, qualitative or a mix of the two. A quantitative research method typically involves data collection through structured interviews, questionnaires or numerical data from large samples to provide statistical results. A qualitative research method typically involves evaluating variables such as experiences, behaviours or attitudes collected through open interviews or focus groups. The major types of quantitative research are experimental and non-experimental research, while there are five major types of qualitative research; phenomenology, ethnography, case studies, grounded theory and historical research (Godwill, 2015). Quantitative research seeks to gather factual data, to study relationships between facts and how such facts and relationships accord with theories and the findings of any research previously done, while qualitative research seeks to gain insight and to understand people's perception of the theory, whether as individuals or groups (Fellows and Liu, 2015).

2.1.4 Data analysis

When analysing the information retrieved from the research, there are generally two distinct approaches; *deductive* and *inductive* analysis (O'Gorman and MacIntosh, 2015). A deductive approach involves developing theories or hypotheses and then testing these through empirical observation. On the other hand, an inductive approach involves developing theories or hypotheses based on empirical observations like experiences from the real world or grounded theory from the literature (Lancaster, 2005). Godwill (2015) describes the deductive approach as moving from general ideas/theories to specific situations and the inductive approach as moving from specific situations to general ideas/theories. The deductive approach implies deducing a particular idea or theory from a general aspect like a broad theory, where the objective is to have a clear theoretical position before collecting data that can be used to address a specific problem or question. On the other hand, the inductive approach implies inducing results from looking at particular problems or questions which can be generalized as a theory to be tested by others to see if it produces the same results.

Furthermore, the data analysis may be either *empirical* or *non-empirical*. Empirical analysis means that it is evidence and fact based through direct observation and experimentation for data collection to acquire new knowledge, while in a non-empirical analysis the decision-making is based feelings, intuition, or personal thought without any scientific judgement (Godwill, 2015).

2.1.5 Choice of method

The thesis will try to answer the research questions stated in the introduction by analysing the existing literature and gathering information from the case project. Considering the topic and the research questions, it will be important to gain insight from the practitioners' experiences and thoughts on the grounded theory from the literature. It will also be important to see whether it is possible to induce theoretical contributions through looking at the particular situation of the case project.

The topic of contract strategy, project delivery method and incentives in contracts spans different fields of study, but the research can be best described as management research. Thus, the nature of management research as discussed in section 2.1.1 suggests that the study should be multidisciplinary and practice-based, that means the study has to span different literatures and consider how the theory has been used in practice. Projects are a tool within many subject areas, from energy to medicine to computer science, just to mention a few. The study will need to be consistent with this focus, and will need to synthesize the different literatures, from different field of studies, applied at different subject areas. This study will follow an interpretive paradigm, which means it will focus on the meaning of things and try to understand by looking at the totality of the situation from different perspectives. The interpretivist paradigm is contrasted by the positivist paradigm, that rather focuses on facts by looking at causality and fundamental laws to formulate hypotheses that can be tested through large samples. The research will be qualitative and be on the form of a case-study, using literature reviews and interviews to gather data. Furthermore, the research will use an inductive approach to analyse the information throughout the literature and observed during the interviews.

The theoretical framework created by synthesizing knowledge from the literature review will be applied to the case study to form the discussion and conclude on the problem statements and research questions. The case-study was chosen since it provides real life experiences and can potentially highlight differences and flaws in the literature. The case study at hand is an attempt at an innovative approach to try to solve some of the challenges and problem statements that this thesis aims to address. Furthermore, given the nature of the topic, being able to observe and absorb information and experiences from actual consultants, project managers and contractors and their perspectives was deemed as highly important.

Considering the case study only concerns one specific part of the project management field of knowledge, and that the case project revolves around a quite specific part (industrial housing project) of the construction industry, not all of the theoretical framework may apply and there might be contradictions and misalignment between the two.

2.1.6 Quality of the research

Considering the research is using a case-study as part of the method, and the case-study is confined to one particular construction project, the quality of the results should be discussed. There are generally three criteria that can be used to assess the quality of the research; validity, reliability and generalizability (Leung, 2015).

According to Leung (2015), validity can be described as “appropriateness” of the tools, processes and data. This means that you have to assess whether the research questions are valid for the desire outcome, the choice of methodology is appropriate for answering the research questions, the research design is valid for the methodology, the sampling and data analysis is appropriate, and that the results and conclusions are valid for the sample and the

context. The validity of the research is upheld at best effort through the justification of the choice of research method as described in this chapter.

According to Leung (2015), reliability refers to the exact replicability of the process and results for quantitative research. For qualitative research such definition is challenging and counter-intuitive considering the diverse paradigms and epistemologies. Thus, the reliability should be linked towards consistency. The reliability of this research is attempted at best effort by a rigorous description of the procedure for the literature study to compile the theoretical framework, through the use of peer-reviewed articles and books, and the inclusion of transcripts and interview guide for the interviews.

Generalizability refers to the fact of being generalizable, in the sense of research it means to which degree the results and conclusions are applicable for the general situation or theory. According to Leung (2015), generalizability is usually not an expected attribute of qualitative research since the method is meant for studying a particular issue or phenomenon in a specific context. However, generalizability may be relevant for qualitative research as well through increasing use of meta-synthesis, meta-narrative or meta-ethnography to synthesize knowledge. Also, the use of case-study as part of the research method will affect the generalizability. Case-studies rarely allow generalizations to be made from specific cases to the general population as well as producing a lot of different data that can be interpreted in many different ways (Easterby-Smith et al., 2008). Considering the research method includes the use of a case-study and that it uses a qualitative and inductive approach, the results and conclusions may not be generalizable.

2.2 Literature study

There are different methods on how to do a literature study, also called a literature *review*. There are three different types, or categories of reviews: a systematic review, a best-evidence synthesis and a narrative review (Dochy, 2006). These three different types have their own qualities and perspectives on how to review a topic.

2.2.1 Definition

Hart (1998) defines a literature review as:

The selection of available documents (both published and unpublished) on the topic, which contain information, ideas, data and evidence written from a particular standpoint to fulfil certain aims or express certain views on the nature of the topic and how it is investigated, and the effective evaluation of these documents in relation to the research being proposed.

2.2.2 The stages of the review

There are usually several stages of a literature review. To get a brief understanding of what a literature review may consist of, Gough (2007) provides a list of stages:

1. Review question
2. Inclusion and exclusion criteria
3. Search strategy
4. Screening
5. Mapping
6. Data extraction
7. Quality and relevance appraisal
8. Synthesis
9. Communication, interpretation and appliance

2.2.3 Type of review used in the study

Considering the author has limited knowledge on the topic before the start of the study, the systematic review method is deemed most appropriate. The systematic review consists of two processes; Firstly, defining review protocols and mapping the field by accessing, retrieving and judging the quality and relevance of studies in your research area. Secondly, reporting the findings to identify where the gaps in the current research exist to indicate where the research might make a useful contribution (Easterby-Smith et al., 2008). Using the systematic review method, one should be able to identify the key literature of the topic that is being researched. The search follows a filtering process using for example exclusion criteria, choice of databases, different keywords, etc. This filtering process is documented rigorously, so that readers of the study understands the decision and may evaluate the quality of the search method. The point of this method is to be systematic in nature, and not to be based on personal choices and bias.

2.2.4 Example: Systematic literature review on “contract types”

The theoretical framework for this thesis includes several different topics from different fields of study. Thus, the literature study was divided into several individual systematic literature reviews for the different topics, each with their own strategy. An example of how the literature review on the specific topic of contract types were conducted is presented below:

1. Review question

Which are the different contract types used in the contract strategy of projects, what are their theoretical advantage/disadvantages and how are they used in practice?

2. Background preparation

Before the start of the search, the most important sources of information were determined. To identify which databases were most appropriate for this study, key terms like “contract”, “type” and “project” were employed using the Oria.no bibliographic search. The Oria.no database includes printed and electronic collections

that the library of the Norwegian University of Technology and Science as well as the other Norwegian universities have access to. A search in the Oria.no returned results across a wide spectre of databases and gave an indication of which databases (like Web of Science, Scopus, etc.) that included most information on the topic.

Searching the Oria.no database with the key terms resulted in the following databases with most returns; Scopus (200 000+ returns), OneFile (170 000+ returns), Web of Science (160 000+ returns), ProQuest (110 000+ returns) and ABI/INFORM Trade & Industry (100 000+ returns).

3. Inclusion and exclusion criteria

The aim of the review was to get a fundamental concept of the topic, so that this knowledge may be used in the theoretical framework of the thesis and create a good fundament to be used in the discussion. Considering this, only some sources of information were deemed important to be able to limit the search. The literature review excluded news articles, conferences, reviews, technical reports, dissertations, web-pages and statistical datasets. That is, the literature review included only books, book chapters and peer-reviewed articles/papers. The reason behind this was to properly limit the search to the general information, rather than the specific. Also, all sources of information that are not relevant to projects, or the project management field of study were excluded.

4. Keyword search

The next step of the review strategy was to define the detailed keywords and search strings. Since the topic of the review was “Contract Types in Projects”, possible keywords that were included were; Contract, Project, Type, Form, Construction, Incentive, Strategy, etc. The asterisk “*”, used to retrieve variations and related words of a term, were not used considering the risk of getting a lot of irrelevant results (for example, Form* will return Form, Forms, Formal, Formaldehyde, etc.).

Logical operators were also used in the search strings. Words that complement each other were combined using the AND operator (for example, Contract AND Type). Words that substitute each other were combined using the OR operator (for example, Type OR Form). In addition, these operators can be combined like this; Contract AND (Type OR Form), to retrieve both variations of the term.

In addition, proximity operators like W/x and NEAR/x would be used where it could to ensure that the results were confined within the topic (for example, Project AND (Contract W/1 (Type OR Form))). The proximity operators were however not used in the Oria.no bibliography, since it does not have this feature. Furthermore, the term Project were included in every keyword search string. This is to ensure that the results retrieved were indeed within the project management field of study, or at least an effort to ensure that the results were relevant to projects.

The different keywords used in combination with each other are listed below:

- Contract	- Type	- Form
- Project	- Format	- Strategy
- Compensation	- Incentive	- Remuneration
- Design	- Fixed	- Price
- Cost	- Reimbursable	- Construction

Table 3: List of keywords used in the systematic literature review on the topic of contract types

5. Exporting the results

EndNote was used to export and manage the references retrieved from the search. The relevance of the information was judged on the basis of the abstract concerning the different articles/papers/books found in the search. To narrow down a manageable size of information to be used further in the thesis, there had to be a basis on the abstracts rather than a read through of the complete work. This was mainly due to time constraints. The abstracts were also interrogated in comparison to the inclusion and exclusion criteria, and the information that did not meet the set criteria was discarded. The main inclusion/exclusion criteria that the abstracts were interrogated upon was the relevance to projects or the project management field of study, as well as describing contract types or the use of them within the field of study.

6. Search procedure

The literature search in itself were divided into different stages. The search was first executed using the Oria.no bibliography, using the three different inclusion criteria of type of material (books, papers, articles) respectively. The issue of the Oria.no bibliography is the lack of proximity operators; hence the searches return unmanageable amounts of results. To limit the results of the searches, another inclusion criterion was implemented, and the topic is restricted to *Project Management*.

The search string “contract AND (type OR form OR format) AND project” were used in the first search, returning the following results: 310 results within books/book chapters, 9 results within papers and 4767 results within articles. Interrogating the abstract of 310 books or their chapters is manageable to a certain degree but checking 4767 articles will take too much time. To specify the search string further, using proximity operators etc., the different databases needed to be searched.

The next stage of the search was moved to the most important databases, which included Scopus, ProQuest, OneFile, Web of Science and ABI/INFORM Trade & Industry. These databases have more features concerning the search operators and may include information that is not found on the Oria.no bibliography. For the searches in these databases, the search string was modified using the proximity operator. An

example of a search string used is “contract W/1 (type OR form OR format) AND project” for Scopus and “contract NEAR/1 (type OR form OR format) AND project” for the others. Using the inclusion criteria, a complete search string in Scopus will look like this; “TITLE-ABS-KEY (contract W/1 (type OR form OR format) AND project) AND (LIMIT-TO (DOCTYPE, “ar”) OR LIMIT-TO (DOCTYPE, “re”) OR LIMIT-TO (DOCTYPE, “ch”) OR LIMIT-TO (DOCTYPE, “bk”)). To compare with the Oria.no search, which returned over 5000 results, the Scopus search returned only 346 document results, a much more manageable result. The different databases have a somewhat different syntax for the search strings as well as defining the inclusion/exclusion criteria and so forth. More comprehensive combinations of keywords and use of proximity operators were used to further limit the search within the specific databases.

This procedure was reiterated using various combinations of the keywords listed in table 3.

This example shows how the literature review on contract types was conducted. Similar procedures were carried out on the other various topics included in the theoretical framework.

2.3 Interviews

To provide a practical perspective in the thesis, five interviews were conducted with various consultants that are involved on the Ulven B2 project that acts as the case study. While the summaries of the interviews are presented as results in the fifth part of the thesis, the complete transcripts can be found in Appendix B-F. The interviews were conducted in Norwegian and the transcripts were translated to English. This means that the transcripts, although at best effort, might not be 100% accurate.

2.3.1 Semi-structured interviews

The interviews were semi-structured, which means that the research questions were used as reference points while the interview in itself was open and allowed the participants to bring up their ideas surrounding the topics. If the participants digressed too much, the research questions were used to anchor the conversation in the interview. According to Galletta (2012), a semi-structured interview offers a great potential to tend to the complexity of the research topic and has the versatility as a method for exploring data grounded in participants’ experience.

The interviews were carried out as casual conversations. This allowed me to capture the essence and experiences of the participants in an unbiased and objective manner. The objective was that the participants were to do the majority of the talking, where I could observe and probe with follow-up questions or ask for more details surrounding the information. A phone was used to record the interviews to allow precision in the data collection, at the permission of the participants. It should be noted, that by recording the interviews you will have a trade-off between precision and honesty. Since the participants

were aware of the recording, they may have been more reserved than what they would have been without, even though the participants are anonymized.

2.3.2 Participants for the interviews

All the participants for the interviews are consultants involved with Team Veidekke DA. This includes architects, HVAC consultants, civil engineers, design managers, etc. from different Norwegian consultancy firms. The transcripts and summaries of the interviews does not contain revealing information of the different consultants to ensure anonymity to the best possible degree. The transcripts were also reviewed and approved by each consultant respectively before included in the appendix.

2.3.3 Objectivity of the interviews

While the objectivity of the interviews is maintained at best effort, through the structure of the interviews to the anonymization of the transcripts and summaries, it might still be some underlying bias in the interviews. It is important to remember that the participants for the interviews are all invested in Team Veidekke DA through their ownership shares, and that their success with the Ulven project is dependent on the success of the collaboration model. This means that the interviews might be biased towards the specific project delivery method used in the Ulven B2 project, compared to other project delivery methods. Furthermore, the consultants might have a bias towards their individual discipline as well, which may be reflected in the different interviews. Even though the consultants and the contractor are on the same “team” by using the general partnership, there might still be reasons for the consultants to defend their position as a participant in the general construction project, as well as being loyal towards their consultancy firm.

2.3.4 Interview guide

Before conducting the interviews, an interview guide was prepared and sent to the participants. The interview guide contained an introduction on the interviewer, a background of the thesis, the research questions that was attempted answered, as well as the purpose of the study. The interview guide also contained practical information on the procedure of the interview and how the data were to be presented in the study. The purpose of the interview guide was to enable the participants to prepare some thoughts and ideas on the topic and the research questions, as well as to be familiar with the practical aspects of the interview.

The interview guide can be found in Appendix A.

3 Theoretical Framework

This chapter will present the theoretical framework of the thesis. The purpose of the chapter is to provide a proper overview of the various concepts that the problem statements are related to. The generic construction project will be explained as well as the project organization with its main participants. Then the project owner's contract strategy with its key instruments will be explained, with a basis in the works of Lædre (2009). Considering the incentives in the contract types are of particular interest, some general and specific theory on incentives will be explained, including some introductory theory on the principal-agent problem and its presence in construction projects. Since the case study involves a new and innovative method of organizing to deliver a construction project, some background on the so-called relational contracting, the concept of lean construction and in particular the emergence of Integrated Project Delivery (IPD) as a method of delivering construction projects are explained. The last section of the theoretical framework will explain some of the typical business structures that are used in Norway, to put the organizational form of Team Veidekke DA in context.

3.1 Construction projects

Construction projects possesses some unique characteristics compared to other types of projects. Often each construction project is unique in the sense that most buildings and constructions are different, and even when they are built from modular designs the geographical locations of the sites will most likely influence the project. Furthermore, construction projects are often large and complex, requiring large amounts of physical resources like materials, tools and machinery which demands substantial financial capital and involves many different stakeholders. Additionally, construction projects produce deliverables that affects a variety of stakeholders other than the intended end-user.

According to Twort and Rees (2004), civil engineering (i.e. construction) projects involves five stages of activity:

1. Defining the location and the nature of the proposed works and the quality and magnitude of the service they are to provide.
2. Obtaining any powers and permissions necessary to construct the works.
3. Designing the works and estimating their probable cost.
4. Constructing the works.
5. Testing the works as constructed and putting them into operation.

This process often contains considerable risks related to the assumptions that are made in the design and estimation of the delivery, since the conditions and environments in and around the construction site might not be as predicted. These risks might lead to severely increased costs if not addressed properly. To deal with the high-risk environment of construction projects, contractual agreements are extensively used to determine which participant has responsibility of which uncertainties and the costs related to the various risks.

3.1.1 The design & construction phases

While all types of projects have several different phases, it is convenient to divide the construction project into two main phases; the *design phase* and the *construction phase*.

The design phase of the construction project involves the engineering and architectural specifications and drawings for the entire project (Sears, 2015). The design phase in itself is often divided into different stages, including preliminary design and detailed design, and often requires certain expertise from consultants from different field of studies. The construction phase of the construction project involves the physical work that put in place the structures defined in the design phase using materials, machines, manpower, suppliers, supervision, management, etc. (Sears, 2015).

While there are additional phases in the construction project, the design and construction phase are the two most evident ones. The most important thing to notice is that these two phases often overlaps in varying degrees and that the participant responsible for the design phase is determined through the contract strategy. Twort and Rees (2004) shows the principal design options that are commonly adopted through different participants and use of contract strategies:

- a) Design by project owner or a consultant
- b) Outline designs provided by project owner and detailed design provided by others
- c) Layout design by project owner and detailed design by contractor
- d) Functional specification by project owner and design by contractor

This means that for example option (a) may warrant a design-bid-build contract design, and that option (c) and (d) may warrant the use of a design-build contract design. See section 3.6 for further details on the specific contract designs.

3.2 The project organization

According to Tsang et al. (2003), an organizational structure “*involves a group of people among whom there are interaction, communication and coordination*” and that there are three principal types of organizational structures:

1. Project organization
2. Functional organization
3. Matrix organization

Jensen (1983) believes it is productive to define an organization as “*a legal entity that serves as a nexus of for a complex set of contracts (written and unwritten) among disparate individuals*”.

The project organization is task-oriented and each member of the team is responsible for a particular task, in contrast to the functional organization which is specialist-oriented where

each member is responsible for their function (Tsang et al., 2003). The matrix organization is a combination between these two.

3.2.1 The project owner

The *project owner*, also known as the *promoter*, the *client*, the *proprietor* or the *buyer*, is the organization, company, person or institution that has ordered the project to procure a certain wanted product or delivery. The project owner is normally the participant that funds and plans the project, and is naturally the participant that determines the contract strategy for the execution of the project (Lædre, 2009). The degree of the project owner's participation in the project is determined by the resources and willingness to take on responsibility for uncertainty, depending on the size and expertise of the organization. The project owner may be public, private or a combination that uses a public-private-partnership (PPP).

3.2.2 The contractor

The Oxford English Dictionary (2018) defines a contractor as:

One who enters into a contract or agreement; a contracting party.

Or in the context of work:

One who contracts or undertakes to supply certain articles, or to perform any work or service (esp. for government or other public body), at a certain price or rate; in the building and related trades, one who is prepared to undertake work by contract.

In the context of construction projects and this thesis in particular, a contractor is the person, organization or company that executes the construction phase (sometimes the design phase as well) of the construction project. The contractor provides materials, manpower, machinery and coordinates the construction of the delivery specified in the project. The contractor also coordinates suppliers and provides expertise in the management of the project.

3.2.3 The consultant

The consultant is the person, organization or company that provides the design or specialized expertise during the various phases of the project. This includes engineering, architecture and various functions of project management (i.e. project managers). In construction projects the consultants are often referred to as *designers* and are prominent in the design phase of the construction project in particular. The different consultants can either be participating through the project owner, the contractor, or both depending on the contract strategy and contract designs.

3.2.4 Cooperative or competitive project organization?

Turner (2007) discusses the ways of viewing the project organization as two folded:

- A temporary organization through which the owner assembles the resources and motivates them, in a climate of cooperation, to achieve their (the owner's) objectives;
- A marketplace, in which the owner attempts to buy the project's outputs at the cheapest possible price, in a climate of conflict with the contractors, in which one party is going to win and one lose.

Turner (2007) continues to argue that the former should be the correct way of executing projects, while the latter is the wrong way. Additionally, the latter view depicts a win-lose relationship between project owner and contractor, which often leads to lose-lose situations. The most desired outcome is arguably a win-win situation.

3.3 The contract

A contract could be defined as a mutual agreement between two or more parties that involves a legal commitment (Skjønhals, 2007). The Oxford English Dictionary (2017a) defines a contract as:

1. *A mutual agreement between two or more parties that something shall be done or forborne by one or both; a compact, covenant, bargain; esp. such as has legal effects (see 2); a convention between states.*
2. *In a legal sense: An agreement enforceable by law*

It is also worth noticing that, by Norwegian law, a contract or other legally binding agreements do not have formal requirements and are just as valid if expressed orally or even passively as they are by writing (signed documents, etc.). Furthermore, the contract is a key tool for procurement of various resource for the project. The contract is the mechanism which the project organization is created, project managers are employed, goods and services are procured and the commercial nature of the project is defined (Turner, 2007).

3.4 Contract strategy

The contract strategy is a central part of the project owner's combined project strategy. The overall contract strategy consists of several instruments and tools, that helps govern the selection of contractors, the distribution of responsibility between contractors and project owner as well as the process of the project. The contract strategy and contract management of projects falls within the procurement management area of project management, one of the nine areas of knowledge defined by the Project Management Institute. There is usually a separate contract strategy for the engineering phase and for the construction phase of construction projects, and choices made for one phase will affect the choices for the other.

The contract strategy dictates which kinds of relationships the project owner will have towards his contractors. Projects are temporary organizations that entail risks and uncertainties (Turner, 2004). These risks and uncertainties needs to be recognized, and the

project owner must decide to which degree he will safeguard himself or his contractors from the responsibility of these. Through the contract strategy, the project owner may develop cooperative or competitive relationships that certainly will affect the project outcome. The contract strategy will depend on the capabilities and resources of the project owner and the contractors, as well as the characteristics of the specific project.

The contract strategy has two extremities according to Lædre (2009), an integration-based and a separation-based contract strategy. An overview of the project owner's contract strategy for the engineering phase of the project is illustrated below (Lædre, 2009). The illustration is freely translated and modified accordingly.

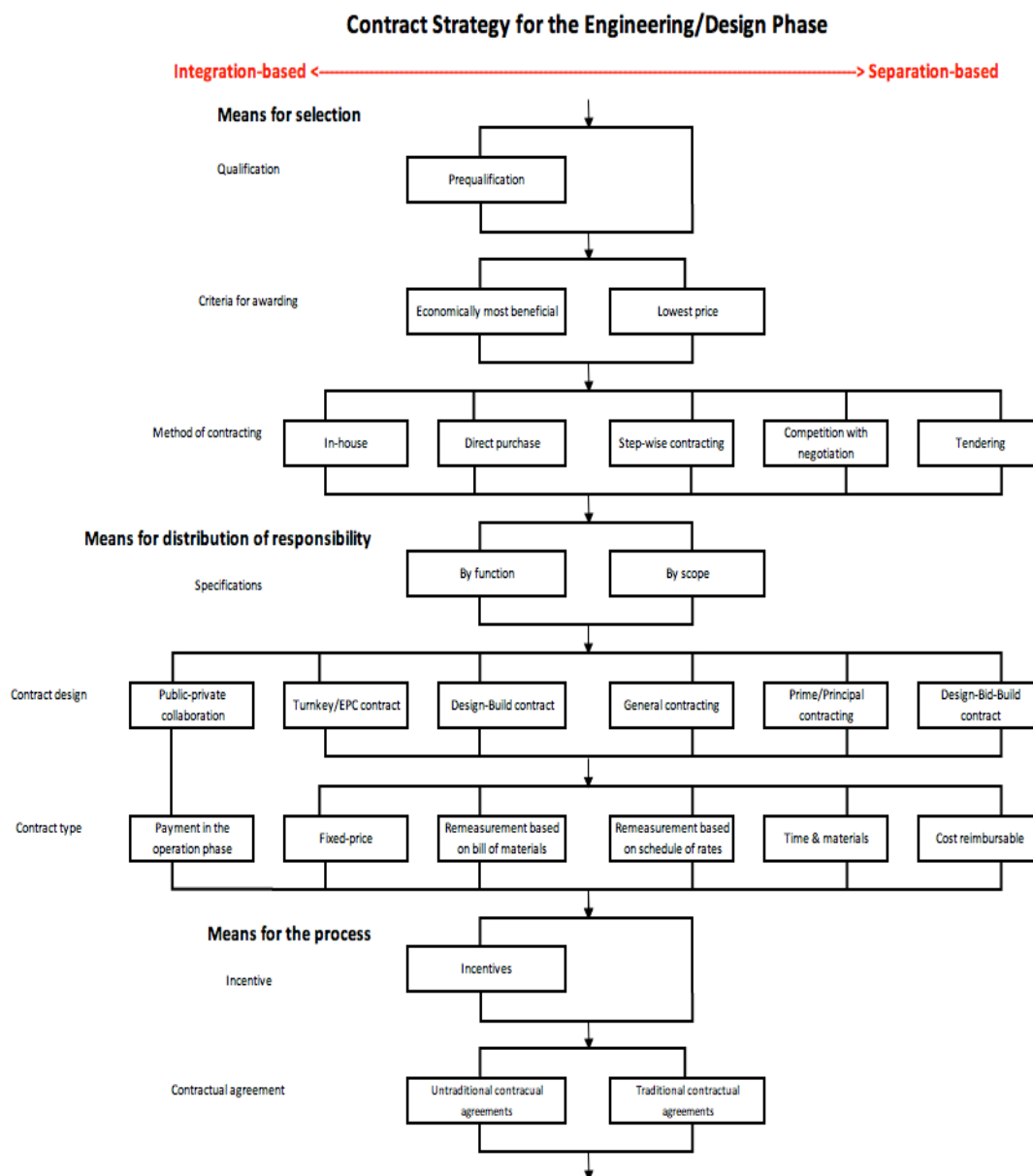


Figure 1: Contract strategy for the engineering/design phase (Lædre, 2009)

With an integration-based contract strategy, the project owner wants to involve the contractors as much as possible and by transferring responsibilities for uncertainty and risks, at the expense of less control and flexibility. With a separation-based contract strategy, the project owner wants to retain as much control and flexibility he can but will also retain the responsibilities for uncertainty and risks. These two extremities are reflected in most of the instruments of the contract strategy as we will see. For instance, the contract design could be integrative by choosing a design-build contract, or the contract type may be separative by choosing a cost-reimbursable contract.

3.5 Method of contracting

The method (or form) of contracting is the way the project owner enters a formal and legally binding agreement on the mutual obligations with his contractors or consultants (Lædre, 2009). There are different methods of doing this depending on whether the project owner wants a separation-based or integration-based strategy.

3.5.1 Traditional strategies of contracting

Lædre (2009) describes five strategies of contracting the project owner may use in construction projects; *in-house contracting*, *direct purchase*, *step-wise contracting*, *competition with negotiation* and *tendering*.

3.5.1.1 In-house contracting

Using this strategy, the project owner basically contracts resources and personnel from its own organization. Hence, this way of contracting is strictly integration-based and demands that the project owner has the appropriate resources.

3.5.1.2 Direct purchase

Another integration-based way of contracting is direct purchase (or direct contracting). The project owner selects contractors or consultants directly without any competitive bidding. Direct purchase is less resource intensive, can provide lower self-cost in the event that the contractor or consultant is familiar with the delivery and may be better suited towards uncertain project deliveries that demand complex equipment or rare expertise.

3.5.1.3 Step-wise contracting

Step-wise contracting involves tying options for future deliveries through initial contracts. In this strategy, the project owner contracts the contractors or consultants as they are needed. The idea is that the project owner should be able to reduce the overall uncertainty in the project by postponing the time of signing the contracts with the contractors or consultants until they are needed.

3.5.1.4 Competition with negotiation

Using a competition with negotiation the project owner offers a tender but can freely negotiate with the different contractors and consultants involved. Different from a traditional tendering strategy where the project owner cannot negotiate, discuss or elaborate the tender, the project owner can reduce the resources needed for specifying the tender using a competition with negotiation instead.

3.5.1.5 Tendering

A tendering means that the project owner develops a universal tender for the project, which he offers on the marketplace to different contractors and consultants. The key feature with the tendering is the fairness it creates for the contractors and the predictability and control it provides for the project owner. In Norway, public institutions are in most cases imposed to use this strategy through regulations on public tendering, while private project owners have more freedom to adjust the tendering process at their will. Naturally, the tendering requires substantial resources and specifications, where the project owner wants as much details in the tender as possible to reduce the uncertainty.

3.5.2 Public tendering in Norway

As mentioned, Norwegian public institutions are in most cases imposed to use a tendering as form of contracting which follows the regulation of the law of public acquisitions (Lædre, 2009). The main reason for the public tendering is to provide the contractors and consultants on the market fair and equal terms of competition and ensure that the tenders are obtained openly which gives the most value for the taxpayer. During the public tendering the project owner and the contractors/consultants are prohibited to have negotiations on details surrounding price, scope, etc. beyond what is specified in the tender. The extensive regulations surrounding public tendering increases the costs of the process, and the prohibition of negotiations or price discussions can sometimes be a disadvantage for all parties.

3.5.3 Design contest as method of contracting

An additional type of contracting strategy is using a contest to decide who is getting the contract. Using this method, the project owner announces a proposition, or tender, with specifications and requirements to the solutions, and the different contractors, sometimes prequalified, competes to propose the best solution. This type of contracting can be beneficial for the project owner in that it saves costs and resources related to preparing specific tenders or designs (Lædre, 2009).

3.6 Contract designs

An instrument for distributing responsibility in the contract strategy is the contract design or contract practice between the project owner and the contractor(s). These contractual agreements must not be confused with the contract types described in the next section. The

contract design decides whom the project owner is entering a contract with in the engineering and construction phases of the project (Lædre, 2009).

In the construction project, the type of contract design decides much of how the project is managed. As with the contract types, which we will see, there are two extremities of contract designs with some hybrid types that combines some of advantages as well as the disadvantages of the two sides. The choice of contract design is based on whether the project owner wants an integration- or a separation-based strategy. The choice of contract design is closely related to the choice of contract type towards the different contractors and consultants, and thus closely related to how the consultants providing engineering work in the design phase are compensated. The different contract designs are therefore briefly described in this section.

3.6.1 The main contract designs

The literature describes various categories and types of contract designs using different terminology and definitions depending on the country and the industry the literature is addressing. For the construction industry, and in particular the Norwegian construction industry, the contract designs can be divided into three main categories; *Design-Build Contracts*, *Management Contracts* and *Design-Bid-Build Contracts*. The design-build contract is considered integration-based, while the design-bid-build contract is considered separation-based. The management contracts, which include general contracting and prime/principal contracting, can be considered hybrid designs that combines elements from the integration- and separation-based designs. The key difference is the allocation of the responsibility of the uncertainty of the project, whether this is on the project owner or the contractor(s) as well as how much control and flexibility is retained by the project owner.

As mentioned, the different categories are often referred to with different terminology. For instance, the design-build contract is sometimes referred to as an *Engineering, Procurement and Construction (EPC) Contract* and the design-bid-build contract is sometimes referred to as a *Traditional Contract* or *Contract Management (CM)*. Furthermore, some industries use other contract designs as well. For instance, a *Turnkey Contract* which can be considered even more integration-based than the design-build contract, is often used when building large power plants or other facilities.

3.6.2 Design-Build contract

The design-build contract is a contract design where the project owner employs a contractor that provides all the detailed engineering/design as well as the physical construction of the project. The contractor's engineering/design is often based on a conceptual design provided by the project owner, and the project owner usually retains an engineer to protect his interests (Turner, 2007). This contract design is sometimes referred to as an Engineering, Procurement and Construction (EPC) contract.

With a design-build contract, the project owner transfers the responsibility of the uncertainty for time, cost, quality and scope onto the contractor (Lædre, 2009). This provides more predictability for the project owner, but the downside is that the contractor will charge a premium for the responsibility of the uncertainty. This contract design is considered integration-based and is the most widely used contract design in the Norwegian construction industry. A standard for the contract design, NS8407, has been developed in Norway (Norge, 2011), which is frequently used in the industry.

3.6.3 Management contracts

These contract designs can be considered hybrid designs that combines elements from the design-build contract on one side, and the traditional contract on the other side. Two types of management contracts that are used in the Norwegian construction industry are the General Contract design and the Prime/Principal Contract design.

The general contract design is similar to the design-build contract in that the project owner has only one main contractor in construction phase. However, the project owner is responsible for the engineering/design phase and will employ separate contractors for this (Lædre, 2009). Thus, the general contract design can be considered a design-bid-build contract in the engineering/design phase, and a design-build contract in the construction phase.

The prime/principal contract design is very similar to the general contract design, but the main contractor employed in the construction phase provides only the building. The project owner employs separate contractors for other types of construction, like electrical work, sanitation, water, etc. This design combines elements from both the design-build and the design-bid-build contract.

3.6.4 Design-Bid-Build contracts

A contract design where the project owner employs different contractors for the different work packages in the project (Görög et al., 1999). The total project is divided in several different contracts with different contractors, instead of combining it into one contract with a main contractor as is the case with the design-build contract. This contract design is sometimes referred to as a Traditional Contract or Contract Management (CM).

The project owner bears the responsibility of the uncertainty of the project as a whole and gets to have much of the control. The different contractors employed are only responsible for the single delivery they are contracted for, and the project owner can determine if he wants to provide the engineering/design or the construction himself or employ a contractor. This contract design provides more flexibility and control for the project owner, but also more responsibility for the uncertainty (Lædre, 2009).

3.6.5 Norwegian standards for contract designs

Standard Norge (Standard Norway) provides standards for both the design-build contract design (Norge, 2011) and the design-bid-build contract design (Norge, 2008), the two extremities of contract designs in the construction and infrastructure industry. These are thus the most widely used contract designs in Norway.

3.7 Contract types

One of the means for distributing responsibility in the contract strategy is the choice of contract type, or contract format (also called compensation format). The contract type governs the compensation from the project owner to his contractors for their performances. This remuneration in the form of payments can be structured in several different ways depending on the choice of contract type.

3.7.1 The main categories of contract types

The contract types are sometimes defined by different terms in the literature. However, the literature seems to agree that there are some main categories of contract types, even though they are coined by different terms. Turner (2007) identifies three basic forms of payments; cost plus, remeasurement and fixed price. Project Management Institute (2013) defines two broad families of contractual relationships; either fixed-price or cost reimbursable, with a hybrid category between these called the time & materials contract. Furman (2015) states that there are two broad categories of contract types; the fixed price versus the cost plus. According to Springer (2016), the contract types are grouped under the heading of two broad categories; fixed price contracts and cost reimbursement contracts. Similarly, Lædre (2009) states that the two most used contract strategies for remuneration of the contractors' services are cost reimbursable and fixed-price contracts.

To summarize, there are two extremities of categories, and the different contract types falls between these categories. For convenience, these two extremities will be referred to as *Fixed Price* and *Cost Reimbursable*, following the terms used by the Project Management Institute (2013). Relative to the contract strategy shown in figure 1, the two extremities of fixed-price and cost reimbursable contract categories represents an integration-based and a separation-based strategy respectively. Depending on the project owner's intentions of integration versus separation of responsibilities in his strategy, he may choose one of the two extremities or a contract type in between.

3.7.2 The specific contract types

As mentioned, there are several contract types that fall within the two main categories defined in the previous paragraph. The most relevant specific contract types will be presented, starting from the integration-based fixed price contract and moving towards the separation-based cost reimbursable contract in the opposite end. The contract types between these two can be considered hybrid contract types, that share some of the advantages and disadvantages of the two extremities depending on the type.

3.7.2.1 Fixed Price contracts

Also known as Lump Sum Contracts, this category of contract types involves setting a fixed contract sum as compensation for the contractors' services. In these types of contracts, the contractor is legally obligated to complete the contract, usually incurring financial damages if they do not. In the fixed price contracts, the quantities cannot be regulated, and the contract sum is not adjusted for wage increase of consultants or workers and price increase of materials. These types of contracts are best suited for projects with low uncertainty and a high degree of specification (Lædre, 2009). The fixed price contracts are considered integration-based since the responsibility of uncertainty is transferred to the contractors. Before the contractor accepts a fixed price contract he will need to conduct a control assessment of the quantities included in the contract. The project owner and contractor will then need to agree on the quantities included in the contract.

- *Firm Fixed Price Contracts (FFP)*. The traditional and most commonly used fixed price contract is the FFP contract. The contract sum is not subject to change unless there are changes to the scope of work, any other changes in costs are the contractor's responsibility. This type of contract requires the project owner to clearly specify the product or service to be procured (Project Management Institute, 2013).
- *Fixed Price with Economic Price Adjustment Contracts (FP-EPA)*. This fixed price contract is used when the contractor is under contract for a considerable amount of time, and his performance spans several years. The contract has a fixed contract sum, but also includes a provision for pre-defined adjustments due to changes like inflation or material costs over the period. The advantage of the FP-EPA contract is that it protects the project owner and contractor from external conditions beyond their control (Project Management Institute, 2013, Furman, 2015, Springer, 2016).
- *Fixed Price Incentive Fee Contracts (FPIF)*. This type of the fixed price contract provides some more flexibility by introducing an additional incentive to the contractor for achieving some agreed upon metrics or predefined milestones. The contractor is rewarded an incentive fee, that is typically related to improving metrics like cost, schedule or technical performance. A price ceiling is set for the FPIF contracts as well, where the contractor is responsible for any costs above (Project Management Institute, 2013, Furman, 2015).

There are both advantages and disadvantages related to fixed price contracts. The main concern is regarding the allocation of the responsibility of uncertainty and to which degree the project deliveries can be specified.

Advantages of fixed price contracts:

- The fixed price contract provides less responsibility of the uncertainty for the project owner.
- If the project owner is unable to handle the consequences of the uncertainty of the project, using a fixed price contract may contribute to transferring the uncertainty onto the contractors.
- Fixed price contracts can be better for the project owner when there is more competition between contractors. Since there is a fixed overall price on the contract the contractors may reduce their premiums and try to compete on being most productive.

Disadvantages of fixed price contracts:

- The fixed price contract provides more responsibility of the uncertainty for the contractor.
- The project needs to be properly specified by the project owner, which takes time and requires a context with less uncertainty.
- The contractor most likely will conduct a control assessment of the quantities included in the contract. Mistakes in the assessment made by the project owner may not be corrected by the assessment made by the contractor, since the contractor will most certainly have less time to make the assessment.
- The fixed price contract requires the contractor to have the ability to handle the consequences of uncertainty.
- There is a need for the project owner to control that the contractor has a feasible budget to complete the work and that they produce in line with the expenses, since there are no incentives for the contractor to produce and deliver more than what is specified.

3.7.2.2 Remeasurement contracts

This category of contract types can be considered hybrid versions of fixed price and cost reimbursable contracts. The remeasurement contracts is similar to the fixed price contracts in the way of awarding the contractor for the work done, but can be remeasured for certain metrics like materials, quantities or hourly rates similar to the cost reimbursable contracts.

- *Remeasurement based on Bill of Materials contracts (R-BOM)*. This remeasurement contract sets a fixed price for completing various work packages, but accounts for changes in the use of materials within these. The standard larger work packages are identified and the price for completing these work packages are set in the contract similarly to a fixed price contract. However, the contractor is reimbursed for the costs incurred for procuring materials, since each work package may be less specified. Hence, the R-BOM contract effectively works as a fixed price plus variations (in materials)

contract (Turner, 2007). In this type of contract, the project owner takes the responsibility of the uncertainty regarding the amount of materials.

- *Remeasurement based on Bill of Quantities contracts (R-BOQ)*. This remeasurement contract sets a fixed price for completing various work packages, but accounts for changes in the number of work elements. This contract type is best suited when the work packages can be clearly identified, but the project scope, or rather the number of the work elements is uncertain. Hence, the R-BOQ contract effectively works as a fixed price plus variations (in quantities) contract (Turner, 2007). Similarly, as in the R-BOM contract, the project owner takes on the responsibility of the uncertainty regarding the quantities.
- *Remeasurement based on Schedule of Rates contracts (R-SOR)*. In this type of remeasurement contract the amount of labour and materials used in the various work packages are measured. The contractor is paid according to hourly and unit rates, and the quantities and rates can be adjusted for changes in scope and price (Turner, 2007). In this type of contract, the responsibility for production is at the contractor while the responsibility of the quantities is at the project owner. The R-SOR contract can in some ways be considered a cost reimbursable contract.

Advantages of remeasurement contracts:

- The different remeasurement contracts can combine some of the advantages from both the fixed price and cost reimbursable contracts.
- The contract types can be better tailored to the specific project depending on the context and the ability of both the project owner and the contractor to handle the consequences of the uncertainty related to different aspects.

Disadvantages of remeasurement contracts:

- The different remeasurement contracts share some of the disadvantages from both the fixed price and cost reimbursable contracts.

3.7.2.3 Time & Materials contracts

The time & materials contracts are another hybrid type of contracts, which can be considered a combination of a fixed price and a cost reimbursable contract. The contract is similar to the cost reimbursable contract in the way it is left open ended and the cost increases are reimbursed by the project owner. The exact value of the contract may not be specifiable by the project owner, and the contract price may change. However, the contract usually has a ceiling on values as well as time limits to prevent unlimited cost growth (Project Management Institute, 2013, Furman, 2015). The contract can be considered a cost reimbursable contract up to the target price or price ceiling, and a fixed price contract beyond (Turner, 2007).

Advantages of time & materials contracts:

- Combines advantages from both the fixed price and the cost reimbursable contracts.
- Can be better suited for acquisition of experts and any outside support, when the statement of work cannot be properly specified.

Disadvantages of time & materials contracts:

- Shares some of the disadvantages from both the fixed price and cost reimbursable contracts.
- The contractor takes on all the downside risk but shares none of the upside opportunities.

3.7.2.4 Cost Reimbursable contracts

Also known as Cost Plus Contracts, this category of contract types involves reimbursing the contractor for all legitimate actual costs for completing the work described in the contract. Additionally, the contractor is awarded a fee on top of the reimbursement to represent the profit (Project Management Institute, 2013). This fee can be represented differently, for instance an incentive fee or a percentage fee. The premise for the costs that are to be reimbursed is that they are allowable by the project owner, hence the contract does not cover costs that are unnecessary or irrelevant to the project (Springer, 2016). The cost reimbursable contracts are considered separation-based since the responsibility of the uncertainty rests on the project owner rather than the contractor. These types of contracts are best suited for projects that have a high uncertainty related to scope, and a low degree of specifications (Lædre, 2009).

- *Cost Plus Percentage Fee Contracts (CPPF)*. The contractor is reimbursed for all allowable costs related to the contract work performed and awarded a fixed fee calculated as a percentage of the estimated costs of the contract work. The fee is paid only for completed work and is only subject to change if the scope of the project changes. The percentage fee could also be based on actual costs rather than estimated costs, but this is rarely the case since the contractor could in theory just increase the costs and be rewarded for doing so. Percentage fee based on actual costs are for instance illegal when dealing with the U.S. Government (Springer, 2016, Furman, 2015).
- *Cost Plus Fixed Fee Contracts (CPFF)*. Similar to the CPPF contract the contractor is reimbursed for all allowable costs and awarded a fixed fee. However, this fixed fee is not calculated as a percentage of the estimated costs, but rather a negotiated fee that is fixed at the inception of the contract (Project Management Institute, 2013, Springer, 2016).
- *Cost Plus Incentive Fee Contracts (CPIF)*. The contractor is reimbursed for all allowable costs related to the contract work performed. The contractor is awarded an initially negotiated fee to be adjusted later by a formula based on

the contractor's performance towards certain objectives in the contract. A typical performance objective is setting a target cost, where the contractor is rewarded for keeping the actual costs below this target but may end up sharing the costs that exceeds the target. Other performance objectives may include setting a target schedule or a certain quality standard (Project Management Institute, 2013, Springer, 2016).

- *Cost Plus Award Fee Contracts (CPAF)*. The contractor is reimbursed for all allowable costs related to the contract work performed. The contract provides a fee that is awarded based on the satisfaction of certain broad subjective performance criteria set by the project owner. This type of contract can be considered a subjective incentive contract, and the fee is usually disclosed by the project owner and not subject to appeals by the contractor. The CPAF contract relies on the contractor's ability to trust the project owner and is of higher risk than the CPIF for the contractor. The advantage of the CPAF is the improved communication between the project owner and the contractor, and that it is suitable for projects where it is not possible to write contract specifications or a statement of work that describes in detail what work the contractor is expected to perform (Project Management Institute, 2013, Springer, 2016, Furman, 2015).
- *Cost Sharing Contracts*. The project owner and contractor agree to share the costs, and the contractor is only reimbursed for a certain portion of the actual costs. The percentage of the costs to be shared is agreed upon contract award. Springer (2016) gives the example of the contractor that may enter a market they have not been in before, where the cost sharing contract is suitable as a mechanism for entering (Springer, 2016).
- *Alliancing Contracts*. This variation of the cost reimbursement contract involves a cooperation between the project owner and the contractor to reduce the scope of works and hence the price as well as achieving other performance indicators such as time, safety, quality, etc. A gain share fund is established by the project owner, which is split between the contractors upon achievement of the performance indicators set by the project owner. This form of contract relies on cooperation and only works if both the project owner and the contractor(s) can contribute to reducing risks and achieving the performance indicators (Turner, 2007).

Advantages of cost reimbursable contracts:

- The cost reimbursable contracts provide less responsibility of the uncertainty on the contractors, since the contract is open ended.
- The project owner has more flexibility as well as the possibility to control and suggest changes for the contractor, as the contractor is continuously billing the project owner.
- It is easier for the project owner to control the contractor into delivering more than minimal specifications.

- The possibilities of running contractors in parallel are bigger since the cost reimbursement contracts are better suited when there is a low degree of specifications and the uncertainty is higher. Contractors can be signed on to the project before the scope of work is completely specified, and they are compensated for actual work done.

Disadvantages of cost reimbursable contracts:

- The cost reimbursable contracts places most of the responsibility of the uncertainty on the project owner.
- The contract type demands a certain trust between the project owner and contractor. Since the contractor is reimbursed for all (allowable) costs, there is the risk of costs becoming significantly more than what the project owner intended. It may be tempting for the contractor to be less productive than planned, and this may be difficult for the project owner to detect.
- The project owner will usually need to spend resources in the form of time and money to supervise the contractor, making sure that they perform according to the contract.
- There is also the risk that the contractor may allocate his least productive resources on cost reimbursable contracts, and his most productive resources on other (fixed price) contracts.
- It can also be unfortunate for the contractor having his employees too long on cost reimbursable contracts. The employees are paid whether they work hard or not, which may foster a bad working morale at the contractor.

3.7.3 Norwegian standards for contract types

As for the contract designs, Standard Norge (Standard Norway) has provided standard contracts for contracting consultants, construction managers and subcontractors.

This includes:

- NS8401: General conditions of contract for design commissions (Norge, 2010a)
- NS8402: General conditions of contract for consultancy commissions with remuneration on the basis of actual time taken (Norge, 2010b)
- NS8403: General conditions of contract for construction supervision commissions
- NS8417: General conditions of contract for design and build sub-contracts

3.8 Incentives

The Oxford English Dictionary (2017b) defines incentives as:

Having the quality of inciting or arousing to feeling or action; provocative, exciting.

Or in the context of payments:

Of or pertaining to a system of payments, concessions, etc., to encourage harder work or a particular choice of work.

Barnard and Andrews (1971) distinguishes incentives in two classes; specific incentives that are specifically offered to individuals and general incentives that are not personal and cannot be specifically offered to individuals. The first class is called *specific inducements*, while the second is called *general incentives*.

According to Barnard and Andrews (1971), the specific inducements that may be offered can be for example:

- Material inducements (money, physical things, etc.)
- Personal non-material opportunities (distinction, personal power, prestige, etc.)
- Desirable physical conditions
- Ideal benefactions (satisfaction of personal ideals, pride of workmanship, sense of adequacy, loyalty to organization, etc.)

While general incentives that may be afforded can be for example:

- Associational attractiveness (social compatibility)
- Adaption of conditions and habitual methods and attitudes (work methods and work conditions)
- The opportunity of enlarged participation (feeling of importance to a cooperative organization)
- The condition of communion (feeling of personal comfort, solidarity, social security, etc.)

Furthermore, Barnard and Andrews (1971) also says that different people are motivated through different types and combinations of the various incentives listed above.

3.8.1 Incentives in construction projects

According to Lædre (2009), incentives are used as rewards or punishments due to actions pertaining to metrics like costs, time, quality or scope of the project. The incentives may apply both for individuals or for organizations, where the latter is more usual in the project organization.

While incentives traditionally are related to financial aspects, like reducing costs or increasing profits, there are other aspects to consider as well. Kadefors and Badenfelt (2009) considers three different roles of incentives in an exchange between organizations:

1. Incentives as sources of extrinsic motivation
The power of incentives to directly influence the motivation of an individual or an organization.
2. Symbolic roles of incentives
The perceived intentions and dispositions underpinning the incentives.
3. Incentives as process generators
The influence of financial incentives on organizational processes.

However, the most important aspect of incentives, particularly in the contract strategy, is the ability to act as an instrument for distributing responsibility for uncertainty (Lædre, 2009). In many situations, there may be the case that neither project owner, contractor nor consultant wants to absorb the risks pertaining to having the responsibility for uncertainty related to certain phases of the project. The use of incentives may give the proper upsides, especially in financial forms, to absorbing these responsibilities. Additionally, Suprpto et al. (2016) concludes that projects with contractual incentives are likely to perform better than those without.

3.8.2 Financial incentives

The use of financial incentives in construction project contracts are considered key means for improving the outcomes and are typically used to motivate towards above business-as-usual (BAU) goals as well as providing the contractor opportunities for higher profit margins (Rose and Manley, 2011). Financial incentives are also considered an instrument to align the interests objectives of the contractual parties (Rose and Manley, 2010).

There are generally three aspects of the construction project that the financial incentives are meant to improve (Rose and Manley, 2011, Bower et al., 2002, Meng and Gallagher, 2012): Cost, schedule and quality. According to Meng and Gallagher (2012), cost and schedule incentives have received much more research attention than quality incentives.

3.8.2.1 Cost specific financial incentives

Cost specific incentives are the the most researched incentive category of the financial incentives (Kerkhove and Vanhoucke, 2016). According to Bower et al. (2002), cost specific financial incentives can generally be thought of as a combination of inducement and threat. Usually a contractor is rewarded for spending less cost than estimated and penalized for spending more.

Blyth (1969) states that a cost incentive contract includes the following essential elements:

- A target cost, which should be the best estimate mutually agreed by both contracting parties of what the cost will be when the work is done.
- A target fee, which is the amount of profit payable if the actual costs equal the target cost.
- The share formula, which describes the way in which any differences between the actual cost and the target cost are to be distributed between the contracting parties.

3.8.2.2 Schedule specific financial incentives

According to Abu-Hijleh and Ibbs (1989), schedule (or duration) specific incentives are arguably the easiest to implement in a contract considering there are no accounting standards needed to agree upon outcomes of the time dimension. While schedule specific financial incentives have traditionally been on the form of penalties (Bower et al., 2002), where the contractor is financially penalized for delivering after a certain deadline, you can also have a schedule incentive schema that rewards the contractor for delivering earlier than the deadline.

3.8.2.3 Quality specific financial incentives

As mentioned, quality specific financial incentives have received less research attention than the above two incentives. While quality specific incentives are the least used of the incentive types, it is often regarded as the most influential incentive in the contracts when it is used (Tang W, 2008). According to Kerkhove and Vanhoucke (2016), quality specific incentives are rarely used when there are already cost and schedule specific incentives in place.

3.8.3 Semi-financial incentives

Harris et al. (2013) describes semi-financial incentives as compensations that are rewarded indirectly. For instance, this could be long term goals like bonuses or opportunities for promotions or auxiliary compensations like pension schemas, share options, company cars, sports facilities, etc. However, in association with projects, semi-financial incentives will refer to incentives that may provide motivation for doing something to achieve some future financial gains or indirect financial gains from doing it. An example might be, that a contractor feels motivated to put in extra effort on a project, because he knows through the contract that there is a high probability to be contracted for future projects if they have success in the delivery.

3.8.4 Non-financial incentives

Non-financial incentives are usually fairly intangible and related to higher motivational needs like self-fulfilment and self-expression that can be described as “intrinsic motivators”. These

incentives acknowledges the individual and recognizes the needs for social satisfaction (Harris et al., 2013). These non-financial incentives are often difficult to state contractually, but research in economics and psychology shows that non-financial factors play a key role in job performance and can stimulate to voluntary performance through the intrinsic motivation at the agents (Darrington and Howell, 2011).

3.8.5 Transaction costs

According to Nugent (2014) transaction costs can be defined as:

The costs of specifying, reaching agreement on, and enforcing contracts.

Furthermore, transaction cost economics treats transactions between anonymous buyers and sellers as having real and substantial costs related to them, in contrast to the traditional (neoclassical) economic theories which has previously not recognized these costs (Nugent, 2014).

3.8.5.1 Transaction costs in construction projects

Transaction costs are evident in construction project organizations as with other organizations. Most research on transaction costs in construction projects have been limited to the procurement phase of the project, excluding the construction and operational phases (Li et al., 2012). The more interesting transaction costs in the construction project are related to change orders, claims, and in the worst-case legal disputes. Li et al. (2012) argues that unforeseen events combined with incomplete contracts, especially during the design phase and with specialized work, contributes to substantial transaction costs. Consequently, the transaction costs are often higher in the construction phase than in the procurement phase.

3.8.5.2 Contract incentivization

In Transaction Cost Economics, there are two suggested schemas that help describe contract incentivization; ex-ante incentivization and flexible, farsighted, ex-post governance (Williamson, 1995, Williamson, 1996).

The ability of a contract to provide ex-ante incentivization can be described by the following three parameters according to Turner (2004):

- The reward it provides to motivate the contractor to share the project owner's objectives and perform;
- The associated risk;
- The safeguard provided by the project owner to shield the contractor from the risk.

The ability of a contract to provide flexible, farsighted, ex-post governance can be described by the following four parameters according to Williamson (1995):

- The incentive intensity;
- The ease of making uncontested, bi-lateral adaptations;
- The reliance on monitoring and related administrative controls (transaction costs);
- The reliance on court ordering.

Turner (2004) argues that not only do the contract need to deal with envisaged risks as they arise through the use of incentives and safeguards, but also provide a flexible and farsighted ex-post governance to maintain a climate of mutual cooperation.

3.8.6 Principal-agent theory

The *principle-agent* problem, also called the *adverse selection* problem, is a recurring problem in economic, social and law studies. One of the key elements of the principal-agent theory is the asymmetry of (or differences in access to) information (Quinn, 2011), where the principal and the agent has different access to information on the other part. Another key element of the principal-agent problem is the so called *moral hazard*, where the principal and agent often have competing self-interest, although the agent is hired specifically to represent the interests of the principal (Quinn, 2011).

The concepts of adverse selection and moral hazard are described in the theoretical framework of Moe (1984):

“Adverse selection derives from the unobservability of the information, beliefs and values on which the decisions of others are based.”

And,

“Moral hazard arises from the unobservability of actual behaviour in the ex-post contracting situation”

Moe (1984) further states that adverse selection and moral hazards are general problems whose potential is inherent in all contracting and hierarchical relationships, and that they are a result of the inclusion of transaction costs.

3.8.6.1 The original principal-agent model

Miller (2005) defines a canonical principal-agent model with the following six features or core assumptions:

1. Agent impact
2. Information asymmetry

3. Asymmetry in preferences
4. Initiative that lies with a unified principal
5. Backward induction based on common knowledge
6. Ultimatum bargaining

Which leads to the two primary results:

1. Outcome-based incentives
2. Efficiency trade-offs

The model boils down to a rule of thumb according to Quinn (2011), in that if the costs of monitoring the agent is too high and the agent is risk neutral, the principal will create a contract that creates outcome-based incentives rather than using complex and impractical methods of monitoring the agent.

3.8.6.2 Incentive schemas to counter principal-agent problems

Following Miller's canonical definition, it is clear that incentives can be used as an instrument in the contract between the principal and the agent to counter some of the issues related to the principal-agent problem. Designing such an incentive schema in the contract is the essential challenge of the principal, where both the incentive structure and the mechanisms of monitoring as well as inducing the agent to reveal information to the principal needs to be incorporated contractually (Moe, 1984).

Such incentive schemas are evident in the different scenarios and industries, where for example salesmen are paid commissions to incentivize performance, CEO's are issued shares to better align their incentives with the company and their shareholder's interests, or lawyers paid with contingency fees. The principal-agent theory examines in many ways which contracts are optimal under different circumstances of risk and transaction costs, and explores the ideas surrounding how contracts creates incentives that can align interests of the agent with those of the principal (Quinn, 2011).

3.8.6.3 Theory of agency and principle-agent

Jensen (1983) divides the literature on the principle-agent theory into two separate literatures that addresses the same problem, which he labels as the *positive agency theory* and *principle-agent*. While the positive agency theory is an empirical and non-mathematical approach to the contracting problem of self-interested maximizing parties, the principle-agent is generally mathematical and non-empirical.

Jensen (1983) continues to argue that both approaches have their strong and weak points, and that there have been conflicting views from them. It may seem that the principle-agent problem is difficult to evaluate using strictly mathematical and non-empirical methods, and that the different contracting practises must be seen in the light of their situation. Moe (1984) also points out that static and dyadic principle-agent

models assumes away much of what a comprehensive theory of organizational theory must account for.

3.8.6.4 Principle-agent theory in construction projects

Since the project organization of construction projects involves different parties acting as both principals and agents, the principal-agent problems described in the previous sections will be present. In the case of the traditional construction project, where you consider the three main participants, the project owner, contractor and consultants, there will be different synergies depending on the contract strategy. In the traditional sense, if the project owner decides to use a traditional contract design, the project owner will be principal with both the contractor and consultants as agents. However, the contractor may end up becoming a principal himself through a design-build contract design for instance.

For large construction projects, the project organization can become quite big and complex. Ceric (2014a) shows in her figure (see figure 2) that with a project involving only three parties (owner, contractor, consultant) with their own respective project manager, there are 24 different relationships.

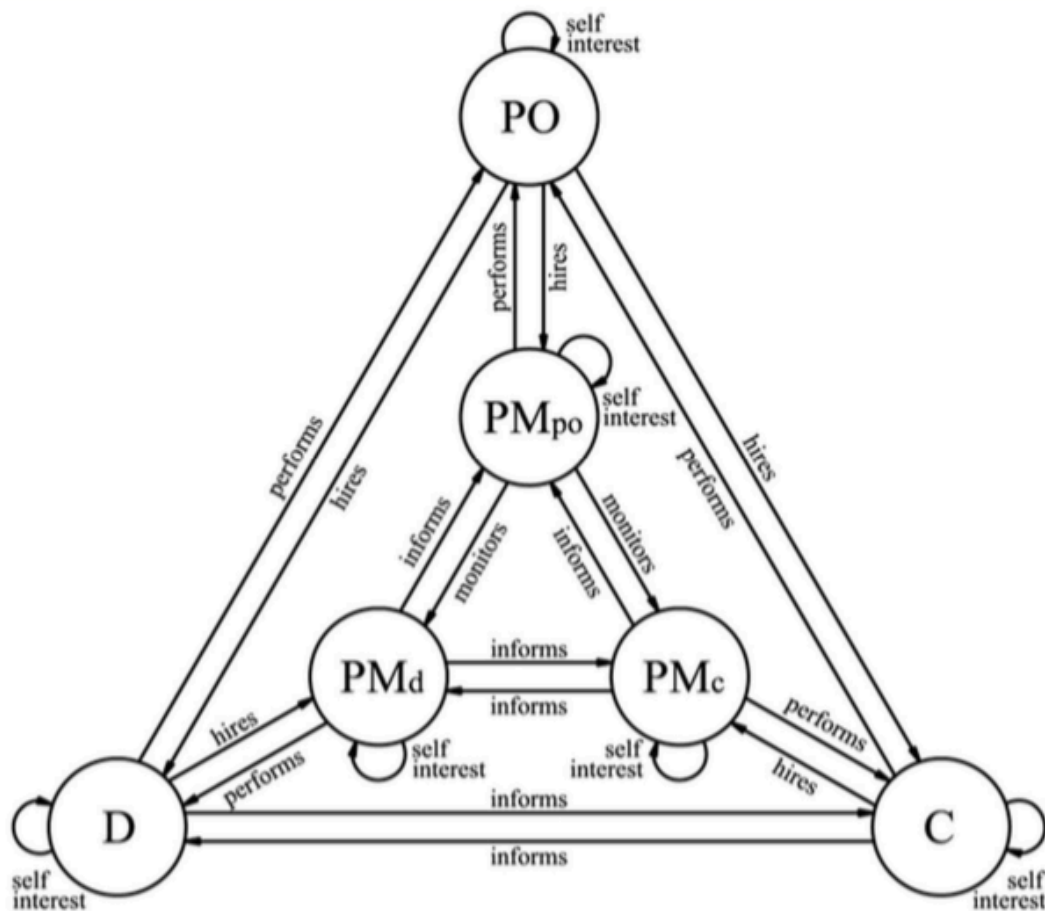


Figure 2: Relationships between project owner (PO), designer (D) and contractor (C), and their respective project managers (Ceric, 2014a)

Ceric (2014a) states that non-contractual relationships start to dominate contractual relationships, and that the project organization becomes increasingly autonomous the longer it lasts. She further points out that the non-contractual gaps in the project organization, which increases with the size and complexity of the project organization, can be detrimental to the project and internal conflicts or collusion may occur. Hence, as shown by Ceric (2014b), trust seems to be the preferred strategy to minimize information asymmetries in construction projects.

3.8.7 Incentives created in the contract types

While some contracts like alliancing contracts or cost plus incentive fee contracts are designed with certain specific incentives, the main categories of contract types will create incentives based on their premise. A broad take on the theoretical incentives created in the two extreme categories are presented below.

3.8.7.1 Incentives created in Fixed Price contracts

The contractor will have an incentive to complete the contract by using as little time as possible, but also with as few resources as possible. Since the contractor is paid a fixed price, the profits will be equal to the price of the contract minus the costs incurred for completing the work. To increase profits the contractor has to reduce costs, which may be on the expense of quality of the delivery. Hence, there is the risk for contractors to deliver only minimum of what is specified in the contract (Lædre, 2009).

Additionally, a fixed price contract provides a potentially high reward but low safeguard for risks for the contractor. The project owner has practically bought himself free from having the responsibility of the uncertainty by paying a risk premium towards the contractor (Turner, 2007).

3.8.7.2 Incentives created in Cost Reimbursable contracts

According to Lædre (2009), the contractor will have an incentive in the short term to use as much time and resources as possible, since all the costs including overhead incurred are reimbursed. The profits for the contractor will increase as the costs increases. Extensive use of resources and time will however increase quality of the delivery, but there is also the incentive for the contractor to use the least skilled personnel on cost reimbursable contracts.

The cost reimbursable contract provides a high safeguard towards the risks for the contractor but a low reward. The project owner covers the responsibility of the uncertainty for risks and increases in costs (Turner, 2007).

3.8.8 Modern contract types with specific incentive schemas

As mentioned, there are some contract types that have integrated incentives in their designs in such a way that they are more aligned towards the success of the overall project. The incentives of these particular contract types are presented below.

3.8.8.1 Fixed Price Incentive Fee (FPIF) contract

The fixed price contract is modified by introducing an incentive fee for the contractor. The incentive fee could be related to certain milestones or be tied to other metrics such as higher quality (Furman, 2015). By using this type of contract, the project owner can try to offset the misaligned incentives created in the default fixed price contract.

3.8.8.2 Cost Plus Incentive Fee (CPIF) contract

Similarly, the cost reimbursable contract is modified by introducing an incentive fee for the contractor if a certain performance target is achieved. The most typical performance objective involves setting a target cost, where the contractor is rewarded for keeping the actual costs below this target (Springer, 2016). By using this type of contract, the project owner can try to offset the misaligned incentives created in the default cost reimbursable contracts.

3.8.8.3 Alliancing contract

This modification of the cost reimbursable contract involves cooperation between the contractors to achieve certain performance targets. A gain share fund is established by the project owner at the start of the project and shared between the different contractors if they meet the requirements. By using this type of contract, the project owner can incentivize collaboration and reduce competition within his project organization (Turner, 2007).

3.9 Relational contracting

Partnering and alliancing are two strategies that have been well defined for a time, and relational contracting takes the ideas of these even further. While partnering is defined as a structured management approach to facilitate team working across boundaries (Rowlinson and Cheung, 2002), alliancing is different in that it instead of the parties being independent and can individually suffer and gain from the relationship, the alliance acts as one single entity that jointly shares risks and rewards to an agreed upon formula (Walker and Hampson, 2003).

Rowlinson and Cheung (2002) has provided a definition for relational (or relationship) contracting:

Relational (or relationship) contracting is based on a recognition of mutual benefits and win-win scenarios through more cooperative relationships between the parties. Relational contracting embraces and underpins various approaches, such as

partnering, alliancing, joint venturing, and other collaborating working arrangements and better risk-sharing mechanisms. Relational contracts are usually long-term, develop and change over time, and involve substantial relations between the parties. Relational contracts are the norm for complex transactions to be conducted in environments of high complexity, where complete contingency arrangements are impossible. Successful completion of the transaction relies on the cooperation and the desire to effectuate the contract. In addition, the contract must allow certain flexibility so as to enable necessary adjustments as appropriate.

Additionally, Jefferies and Rowlinson (2016) states that:

Relational contracting is designed to break down the contractual and commercial walls between the owners, contractors, designers and suppliers so that a trusting team is formed which shares the risks when something goes wrong and shares the savings when the team performs exceptionally well. Costs are expected to be reduced and outstanding results in key areas can be achieved.

3.9.1 Relational contracting in the construction project

Harper (2014) measures project integration in construction projects using relational contract theory. In his dissertation he states that construction contracts are relational exchanges and that projects tend to fail when the human factors are not considered through the contracts. The findings from his dissertation suggests that integration of project teams relates to project success, and that there exists an association between relational contracting and project integration. However, he states that the traditional contract designs of design-build, management and design-bid-build generally do not promote project integration, but that this might be achieved better through Integrated Project Delivery (IPD) contracts. Teamwork and relational attitudes can also seem to be the most essential ingredients for the owner-contractor collaboration as well (Suprpto et al., 2015).

3.9.2 The “people” aspect of project organizations

As with most other types of organizations, the project organization is no better than the people involved. According to Cheung et al. (2005), relational contracting can bring about more harmonious working relationships and develop trusting relationships that encourages a more proactive working-manner, which ultimately can save both costs and time for the project. Harper (2014) also shows that the behaviour of the project organization towards each other as well as other organizations, can affect the project in both a positive and negative way, and that a harmonizing project team are better faced to solve internal conflicts and avoid using external dispute resolutions which gives a better chance of completing the project successfully.

3.10 Lean construction

Lean construction is a concept that developed during the early 1990's and has become an important part of improving the construction industry (Green, 2011). Lean construction builds on the ideas of the famous lean production developed in the Japanese car industry and in particular the Toyota Production System (Womack et al., 1990), and includes many of the same principles.

The Lean Construction Institute has defined lean construction through their framework *Transforming Design and Construction: A Framework for Change* and key parts are excerpted as follows:

Lean Construction is a respect- and relationship-oriented production management-based approach to project delivery-a new and transformational way to design and build capital facilities.... Lean Construction extends from the objectives of a Lean production system-maximize value and minimize waste-to specific techniques, and applies them in a new project delivery process.

Additionally, according to Howell (1999):

Essential features of lean construction include a clear set of objectives for the delivery process, aimed at maximizing performance for the customer at the project level, concurrent design of product and process, and the application of production control throughout the life of the product from design to delivery.

The Lean Construction Institute uses lean construction and Integrated Project Delivery (see section 3.11) synonymously, and the two share many of the same principles. Although, for the purposes of this thesis it could be convenient to view lean construction as the overall idea or vision, and integrated project delivery as a method or contract design to deliver the project.

3.11 Integrated Project Delivery (IPD)

Integrated Project Delivery (IPD) is a *project delivery method* that has been gaining momentum in the recent years. A project delivery method (or project delivery system) is synonymous to the contract designs described in section 3.6.

The American Institute of Architects, California Council, has provided a working definition of Integrated Project Delivery (IPD) through several years of development (AIA, 2014):

Integrated Project Delivery (IPD) is a project delivery method that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to reduce waste and optimize efficiency through all phases of design, fabrication and construction. The Integrated Project Delivery method contains, at a minimum, all of the following elements:

- *Continuous involvement of owner and key designers and builders from early design through project completion*
- *Business interests aligned through shared risk/reward, including financial gain at risk that is dependent upon project outcomes*
- *Joint project control by owner and key designers and builders*
- *A multi-party agreement or equal interlocking agreements*
- *Limited liability among owner and key designers and builders*

The idea of integrated project delivery is to integrate all the participants of the construction project (project owner, contractors, consultants) into one collaborative contract to align interests of the different participants towards to the overall project and its deliveries. Historically, there has been a trilemma in the industry that has forced the project owner to choose between optimizing any two of the three typical constraints for construction projects (costs, time, quality) using the traditional project delivery methods (contract designs). However, integrated project delivery is a method that suggests achieving optimization in all (AIA, 2014).

The key value propositions of integrated project delivery are more flexibility, greater speed and less litigation (AIA, 2014). More flexibility in the way that shared financial incentives enables the project team to collectively search for the solutions that optimizes and supports their business case, greater speed in the way that information flows move more quickly because of better coordination across disciplines and participants, and less litigation because all core team members benefit or suffer together, and legal disputes are encouraged to be solved through collaboration.

3.11.1 More integration to increase efficiency

Construction projects are typically organized into three “camps” or “teams”: project owner, contractor and consultant. Traditionally participants enter these different camps at various stages of the project, and the camps are often separated from each other through extensive contractual walls. Problems often arise because the different phases of the construction project are linked and often reliant on each other, from the early planning phases, the design phases, construction phase and all the way to the operational phase, and that poor collaboration between the participants responsible for the different stages often leads to changes and delays which incurs increased costs for the overall project.

The recent emergence of integrated project delivery, as well as earlier approaches like partnering and alliancing, tries to address these problems by increasing the integration of the participants of the three different “camps” in the project organization. By involving the different parties early in the design, one should be able to increase efficiency through eliminating some of the common issues and provide a higher level of common understanding between the participants. AIA (2007) states that the hallmark of integrated project delivery is the early involvement of all the primary project participants.

3.11.2 The IPD contract

If a project owner decides to use integrated project delivery as delivery method, he will need to figure out how this can be projected through the contract strategy. IPD-contracts, sometimes referred to as “collaboration-contracts” in the industry by practitioners, can have different modifications and adjustments when it comes to contract types (compensation formats), risk allocation, ownership, etc. However, according to AIA (2014) for a contract or project to be classified as true IPD it must follow the definition noted in section 3.11. If a contract or project delivery model uses only components of the IPD principles, and not its entirety, it is not an integrated project delivery.

3.11.3 Legal relationships and “IPD-ish” contracts

Different approaches to integrated project delivery promotes themselves as IPD-contracts, but depending on design and degree of integration some of these contracts may just be “IPD-ish”, as stated by AIA (2014). According to Thomsen (2009), the core team in an IPD project may consider different legal relationships to form the specific IPD- or “IPD-ish”-contract, often depending on the degree the different major participants are integrated. In the following sections the most common legal structures the core team may choose to adopt are presented as shown in Thomsen (2009).

3.11.3.1 Multiple Independent Contracts

Much like the traditional contract designs of design-bid-build and management contracts presented in section 3.6, the project owner can choose to use multiple independent contracts towards the contractors and consultants while at the same time using some of the principles of integrated project delivery.

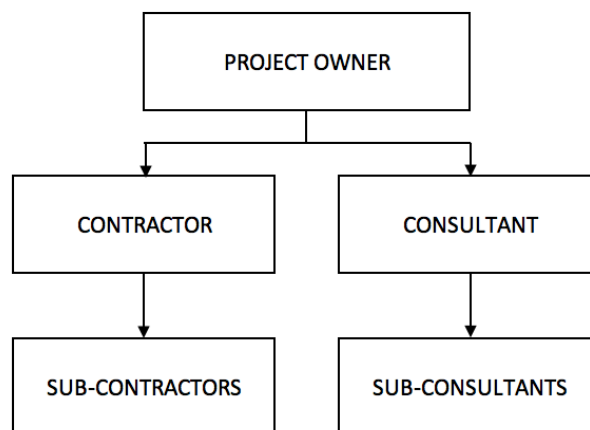


Figure 3: Visualization of a legal structure with multiple independent contracts

While a multiple contract structure with independent contracts does not contribute to the principles of integrated project delivery, the project owner may establish commercial terms to promote integration. Such terms or instruments might be shared

incentive pools, a statement that collaboration is wanted and rewarded, team-meetings, etc.

3.11.3.2 Single Multi-party Contract

The legal structure that probably coincides best with the principles of the integrated project delivery stated by The American Institute of Architects is the use of a single multi-party contract which is signed by all the key participants. In this legal structure the project owner, contractor and consultant sign a single contract that specifies their respective roles, rights, obligations and liabilities.

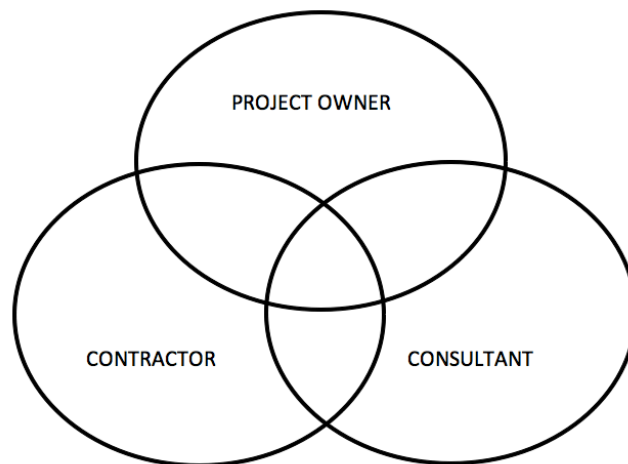


Figure 4: Visualization of legal structure with a single multi-party contract

By using a single multi-party contract the participants are effectively creating a virtual organization to realize the project (AIA, 2007). Also, according to AIA (2007), a multi-party agreement may vary in form, but shares the following key attributes:

- The parties are bound together by a single agreement or an umbrella agreement
- The agreement creates a temporary, virtual or formal, organization complete with management and decision-making processes
- Processes are tailored to support the team environment
- Decisions are arrived through consensus and seek “best for project” outcomes
- Some portion of compensation is tied to project, not individual, success
- Roles are assigned to the person or entity best capable of performing

3.11.3.3 Joint Venture

Another legal structure that can be used is that the contractor(s) and/or the consultant(s) joins in a partnership agreement and forms a joint venture to deliver to project for the project owner. While a “joint venture” is a broad term that may imply different types of partnerships, the legal structure suggests that there are two contracts;

one between the project owner and the joint venture (partnership) and one contract within the joint venture.

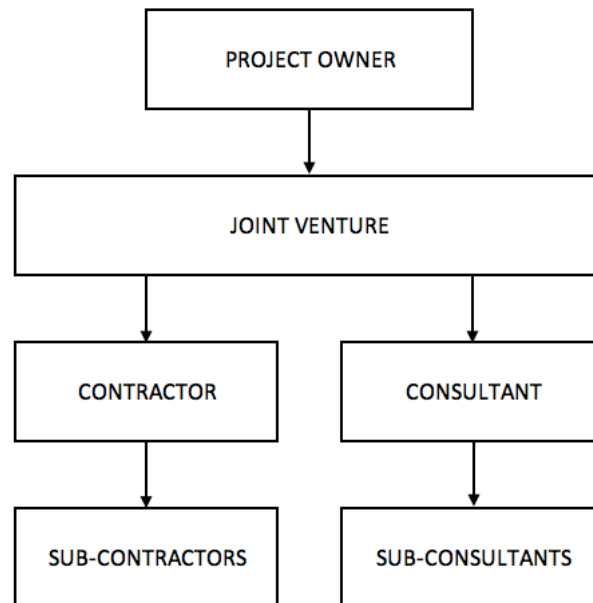


Figure 5: Visualization of a legal structure with a joint venture

This is a legal structure which will form what is referred to as an “IPD-ish”-contract since it can meet most of the principles of integrated project delivery but without including the project owner in the integration. While the project owner is left out of the IPD-contract, the other participants will treat it as a collaboration in the spirit of integrated project delivery. The idea is that the participants involved in the joint venture is incentivized to collaborate for the good of the partnership, even though there still might be conflicting interests between the joint venture and the project owner.

3.11.3.4 Limited Liability Company

Similar to the legal structure with a joint venture, the core team can decide to form a limited liability company (LLC) to deliver the project. This legal structure will also be forming an “IPD-ish”-contract, where they difference to the joint venture is the business structure used in the contract among the contractor(s) and consultant(s).

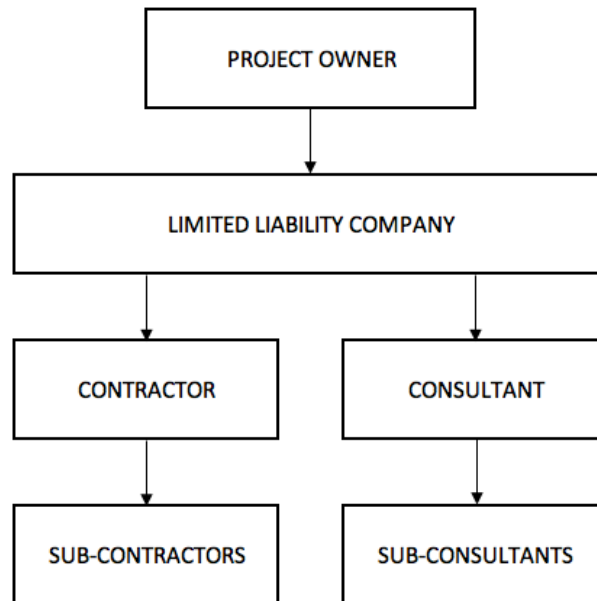


Figure 6: Visualization of a legal structure using a limited liability company (LLC)

The key difference between using a limited liability company and a partnership is that the contractors and consultants will have limited liability towards the project owner. This is certainly something the contractors and consultants will favour, but also something that is not in the interest of the project owner. A limited liability company (LLC) is form of incorporation (business structure) that is used in the United States. See section 3.12 for more on the various business structures that exists in Norway.

3.12 Business structures

Business structures, or forms of incorporation, are ways of organizing your business as a legal entity or person that provides guidelines on taxes, liability, ownership, accounting duties and responsibilities.

3.12.1 Common business structures in Norway

While each country usually has their own forms of incorporation and legislations regarding business structures, they are for most purposes very similar regardless of country. The Norwegian-specific business structures, or “forms of incorporation” are described briefly on Altinn (2017) – the digital government dialogue in Norway, and will be presented here.

3.12.1.1 Sole proprietorship

The sole proprietorship is often the simplest way to set up a business. This business structure is owned by a natural person and is not considered a separate legal person (entity) like many of the other organizational forms. It gives the owner a lot of freedom but also considerable risks considering the owner will have unlimited personal liability for the proprietorship’s finances. The owner cannot be an employee of the sole proprietorship and will be regarded as self-employed, which means inferior

social security rights compared to employees. The sole proprietorship pays taxes in advance four times per year, and the tax rate generally is between 35.4 – 49.9%.

The key features of the sole proprietorship are more independence and freedom, unlimited personal liability, inferior social security rights, that it is not a separate legal person and that it is not very investor-friendly.

3.12.1.2 Private limited company (AS)

Probably the most common business structure in Norway, the AS (Aksjeselskap), is the Norwegian version of private limited companies. In contrast with the sole proprietorship, the private limited company is regarded as a separate legal person. Thus, the personal liability as an owner is limited to the amount of capital provided in the company. Private limited companies follow The Company Act, which among other things requires the company to have a share capital of at least 30 000 NOK. The share capital in the company acts as collateral for the company's creditors, and this share capital cannot be used for investments. The company must ensure that they have an adequate equity and that it is solvent.

Since the private limited company provides limited liability, flexibility and transferability of shares, it is considered preferable for having several owners or bring investors to the company. Additionally, a key advantage with the private limited company is that the owner can be considered an employee and receive salary and get the same social security rights as other employees. The private limited company is governed through its general meetings, where all shareholders have a voting right and a right to attend. The private limited company must hold a general meeting every year.

The most apparent advantage with private limited companies is that it is very investor-friendly. The company can issue shares to bring in new capital, which gives more flexibility regarding the ability to make investments. Profits generated from the private limited company are taxed at a rate of 23% in the 2018 income year. The private limited company can also pay dividends to their shareholders. While dividends to company shareholders are virtually tax-free, the dividends paid to personal shareholders are taxed at 30.59% in the 2018 income year.

The key features of the private limited company are the limited personal liability of the owners (shareholders), the ability to be an employee with the same social security rights, that the company is regarded as a separate legal person and that it is very investor-friendly.

3.12.1.3 General partnerships (ANS/DA)

A general partnership is a business structure where two or more owners (partners) either collectively or individually have unlimited personal liability for the company. It is similar to the sole proprietorship in that it is easy to create, that the owners cannot

be regarded as employees, that the partnership has unlimited liability and that it is not very investor-friendly. However, the partnership shares the advantage of the private limited company in that the profit surplus is taxed by only 23% in the 2018 income year.

The general partnership can have owners that are either natural or legal persons, which means an owner can be a legal entity like a private limited company. The partnership is regulated by The Partnership Act and there are two main forms a partnership can have; either a *general partnership with a joint and several liability* (ANS) or a *general partnership with a shared liability* (DA).

- In a general partnership with a joint and several liability (ANS), all the owners (partners) have unlimited and personal liability for the entire debt. This means that the entire debt of the partnership can be collected by creditors through either one of the owners, and that it is up to the owners to settle the debt between themselves.
- In a general partnership with a shared liability (DA), the owners collectively have unlimited and personal liability, but the owners can only be liable equivalent to their share of the liability. This share must be stated in the partnership agreement.

The Partnership Act stipulates that a partnership agreement must be signed by the owners which contains some minimum requirements for the partnership. After the creation of the partnership, it is possible to alter the distribution of liability from ANS to DA or vice versa through the partnership agreement. The general partnership's supreme authority is the partners' meeting where all the partners are entitled to attend and vote.

The owners can decide to make withdrawals from the partnership either as remuneration (not salary) for work or as distribution of profits. In the case of remuneration, the taxes are paid personally as normal income. Profits generated in the partnership is taxed by a rate of 23%, while distributions to personal partners are taxed with a rate of 30.59% and distributions to company partners are virtually tax-free in the 2018 income year.

3.12.1.4 Co-operatives (SA)

A co-operative is a business structure where different persons or established companies collaborate to promote the financial interests of its members. The members, either as an employee, supplier or customer, safeguard their interests through cooperation where collaboration is more important than achieving maximum surplus. The purpose of the co-operatives is the user benefits and are usually used for member-based organizations.

Co-operatives can be created by two or more natural or legal persons, and the entity must have at least two persons at all times. The ownership is democratic where owners are treated equally and carry the same influence through an equally weighted vote. The supreme authority of the co-operative is the annual meeting, where all the members have a right to attend and to vote. The co-operative acts as a separate legal person, and the owners (members) are in no way liable for their co-operative's debt over and beyond their share contributions. While there are no requirements for share contributions when becoming an owner (member), the co-operative is required to have adequate equity at all times. Surplus shares from the co-operative is paid out to members based on their transactions with the co-operative.

Profits generated within the co-operative are taxed at a rate of 23% in the income year of 2018 and dividends (also called "back payments") are generally tax free for natural persons. However, the dividends are normally taxable for individuals when it is linked to income or costs relating to commercial enterprise or other taxable income-generating activity.

The key features of the co-operative are that there are no requirements for contributed capital, that it is a separate legal person, it is possible to be an employee as an owner, that the ownership is democratic and that it is not very investor-friendly.

4 Case Study: Ulven B2 Housing Project

In this section the chosen case study for the thesis will be presented. The information regarding the case is excerpted from various documents and presentations from both the project owner and the project team chosen to deliver the project.

4.1 The Ulven development

OBOS is Norway's biggest co-operative housing association and has invested in a 280 000 m^2 property area at Ulven in central-eastern Oslo, where they are planning to develop and build 3000 residences and 200 000 m^2 of commercial buildings. The goal is to create a brand-new district of Oslo that provides environmental solutions and reasonable housing for ordinary people.

The Ulven area is located only a couple of kilometres north-east of the central station in Oslo and has up until now been characterized by warehouses, trucks, asphalt and concrete. The plan is to turn this area into new and green housing environments with workplaces, shops and life. The whole Ulven development will be true to a green and environmental friendly mentality, and will focus on solutions that include sharing-economy, facilitation for bicycles, low-energy consumptions, heating from surplus energy from surrounding industrial facilities, etc. The development is already underway, and OBOS is aiming at starting the sales of the first residences in the summer 2018.

4.2 Innovation contest B2 area

In 2016 Ulven AS, a subsidiary of OBOS, announced an innovation and development contest to contract a project team to deliver the housing project on the Ulven B2 area. The innovation contest was divided into two phases, where phase 1 involved a prequalification without limitations and phase 2 involved choosing 3-5 project teams to deliver a concept for the project. The contest comprised the B2 area in the regulation plan and included options for the future development of the B1, B4, D1 and D2 areas for the winner of the contest.

One purpose of the contest was to stimulate innovation and industrial production. Since the contract would include the development and construction of a high volume of residences including options for further development, the project teams were expected to develop a concept that was characterized by an attractive city-environment with good quality and for a lower price compared to the normal market prices. By introducing a high degree of freedom in the project teams' composition and the ability to choose concepts with repetitive modules, the innovation contest facilitates innovation, streamlining and industrialization. Another purpose with the innovation contest was to provide higher productivity and efficiency, as well as lower risk for both the project owner and the contractors/consultants.

4.2.1 Phase 1: Prequalification

This phase included the prequalification of the interdisciplinary project team which is assumed to consist of contractor/developer, architect and other relevant consultants. The purpose of the prequalification was to find expertise that have a correct professional understanding for the task, and which through previous projects can document implementation of big scale projects.

The deliverables for the prequalification phase was:

- Documentation of the team and the how it is organized
- References and previous relevant projects
- Documentation of capabilities of implementation and collaboration
- Documentation of credit ratings
- Presentation of HSE (Health, Safety and Environment) and documentation of HSE-numbers
- Policies regarding sub-contractors and their personnel relationships, employment contracts and illicit work
- The project team's vision for the project
- The project team's thoughts around industrialized production and innovation
- The project team's understanding of the process and how the B2 area is to be developed and built together with Ulven AS

4.2.2 Phase 2: Innovation contest

In the second phase, the 3-5 project teams that advanced from the prequalification were tasked to describe a housing concept that is characterized by an attractive city-environment, possess good housing qualities and be constructed and sold to a lower-than-normal price compared to the general market.

The following framework conditions had to be met:

- The share of small apartments is desired to be larger than the public imposed requirements for apartment distribution in Oslo
- Facilitation for rental opportunities in larger apartments
- Green roofs for common areas/greeneries
- A local garbage disposal for the area is presupposed
- Interface for district heating is put by the heat exchanger
- Good parking options for bicycles
- Descriptions and suggestions for how the area can facilitate for the future implementation of electric cars
- Parking coverage is set to half of the city's minimum standard
- Construction costs: Ulven aims to achieve a construction cost of 22 – 25,000 NOK per square metre of usable area for the residences, excluding parking, including value added taxes. Outdoor area is to be included. Commercial areas have separate costs. The cost represents normal site conditions.

- Ulven AS will be conducting site evaluations and a report from these evaluations will be sent to the participants of the contest.

The participants of the innovation contest had to deliver a concept that was within these framework conditions, unless demands for exemptions are met. In addition, the participants had to deliver an alternative concept with a 25% more utilization than the current regulations. After the innovation contest, the winner was also rewarded with a 10-year option for further development of the areas B1, B4, D1 and D2.

4.2.2.1 Evaluation criteria for phase 2

The following criteria, in random order, were assumed for the winner of the contest:

- Good architecture
- Good layout where kitchens and bathrooms are especially emphasized
- Functional balconies
- Facilitation for “soft” road users
- Number of, and location of parking options for bicycles
- Solar conditions
- Possibilities for variation of facades
- Housing environment, both private and public outside areas
- Overall concept
- Environmental characteristics, choice of materials and energy consumption
- Robust and durable solutions in relation to administration, operation and maintenance
- Use of Building Information Modelling (BIM) in the construction phase.

4.2.2.2 Competition rules for phase 2

The following competition rules were set for the innovation contest:

- Every participant/team that advances through to phase 2 is remunerated by 150,000 NOK
- An interdisciplinary council submits recommendations for winning concept to Ulven AS
- Developer has the freedom to reject all suggestions and not go into contract
- Developer has the rights and ownership to the deliveries in the contest

4.2.2.3 Description of the deliveries for phase 2

- Description of concept
- Total price. Price per utilized area for the residences. Price per utilized area for the commercial buildings.
- Situational map / outdoor zoning plan M 1:500
- Typical stories zoning plan M 1:200
- Garage plan / basement plan with storage M 1:200
- Facades M 1:200
- Interface M 1:200
- Interface of surroundings and property M 1:500
- 3D illustrations / volume studies
- Sun-shade diagrams
- Matrix with distribution of apartments and layout of area per story, total gross area and total utilized area
- Calculation of net outside area
- Description of delivery
- Description of BIM-concept
- Statement for the process and how the area is to be developed and built with Ulven AS
- Other relevant information that the competing teams wishes to present

Additionally, it is expected that a collaborative contract is to be agreed with the project team on the basis of Norwegian Standard NS8407. Parallel with the innovation contest, Ulven AS will develop the Ulven B3 area which can be used as a basis for comparison for how the participants have solved the task.

4.2.3 Evaluation report of the innovation contest

Bygg21, a wide collaboration between the construction industry and Norwegian government institutions that facilitates for better solutions for sustainability, productivity and cost development, published an evaluation report developed by HR Prosjekt AS that evaluates the innovation contest used by OBOS to contract the project team for the Ulven B2 project (HRP, 2017).

The evaluation report compares the innovation and price/design contests, including the one used for Ulven B2, with traditional forms of contracting. The report used an evaluation model developed by the Norwegian University of Science and Technology (NTNU) and Prosjekt Norge and the results was presented as a gap-analysis which compares the performance of the innovation contest with the performance of an earlier reference project. The reference project used for the Ulven B2 project was the Ulven B3 project, the parallel housing project developed by OBOS through traditional project delivery.

4.2.3.1 Ulven B2/B3 specific results from the evaluation report

The gap-analysis shows that for the Ulven B2 / Ulven B3 the innovation contest scores **better** on the following criteria:

- New documented competence/expertise
- Environmental ambitions
- Degree of innovation
- Actual/expected costs

The gap-analysis shows that for the Ulven B2 / Ulven B3 the innovation contest scores **equally** on the following criteria:

- Number of contractors in the competition of the main contract
- Degree of digital collaboration (share of participants integrated)
- Yield
- Owner costs
- User satisfaction
- Location quality (increase in voluntary use of the surroundings)
- Actual/expected progress

The gap-analysis shows that for the Ulven B2 / Ulven B3 the innovation contest scores **worse** on the following criteria:

- Degree of clarity in needs and demands (specification vs. solution)
- Suitability in relation to the project owner's expected offer
- Framework factors
- Delayed decisions from the project owner
- Potential for conflict

4.2.3.2 General key findings and recommendations

The evaluation report suggests that the innovation and price/design contests facilitate for innovation and learning, both towards solutions and the form of contracting. However, this assumes that the project owner is open towards new solutions and that they are not too closely tied to the traditional methods. The evaluation was made at a point of time where the projects were still in an early phase with limited available data which means that the evaluation cannot conclude on costs, yields and end-user satisfaction. Thus, the key findings are mainly qualitative and relies mostly on interviews with representatives from the project owners.

The evaluation shows that innovation and price/design contests are time consuming for potential contractors, and that they are in no way shortcuts towards completed projects. The project owners find it more demanding to convey their expectations under innovation and price/design contests, and it is a concern that these expectations

are not expressed explicitly. Furthermore, the evaluation report shows that innovation and price/design contests are better suited for projects where the project owner desires new and innovative impulses from the supplier market. These contest opens up for more groups of contractors and consultants to deliver solutions to the project owner. If the project owner uses detailed specifications for the contest it will be limited to architectural solutions, while if they use functional descriptions the participants receives more freedom to find innovative solutions.

4.3 Team Veidekke DA and “The Secret Garden”

In April 2017 Team Veidekke DA won the innovation contest promoted by OBOS for the development of the Ulven B2 housing project with their solution “The Secret Garden”. With Veidekke as the front-runner, Team Veidekke DA was established as the project team to enter the innovation contest and later deliver the housing project. Team Veidekke DA is a collaboration between Veidekke as the contractor and several leading companies and consultancy firms in the Norwegian industry that are renowned for their quality, expertise and unique understanding of collaboration, holistic point of view and use of IT-solutions in their work. Team Veidekke DA will act as the main-contractor in a design-build contract with the project owner that includes a fixed price for the project.

4.3.1 The legal structure

Team Veidekke DA is organized using a general partnership with a shared liability (DA).

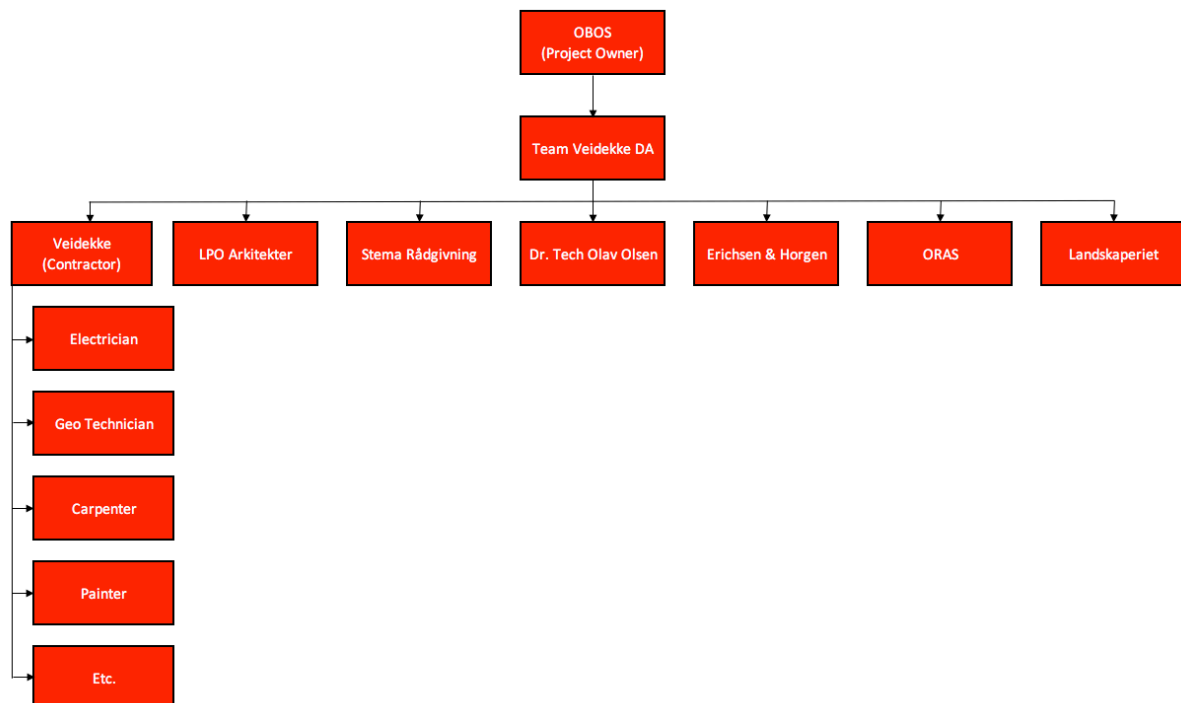


Figure 7: Legal structure of Team Veidekke DA

According to Team Veidekke DA, the main intentions for this choice of business structure is the following:

- The general partnership with a shared liability will to a high degree create a sense of community, collaboration and cooperation among the participants. The participants will be “in the same boat” that pulls in the same direction. This organizational incentive will give them a solution-oriented and collaborative competitive advantage. A business structure like this has not been tested in the construction industry in this way before, but Team Veidekke is confident that this will be necessary to provide a new standard for optimal and cost-efficient project delivery method for large construction projects like the Ulven B2 project.
- As part of reducing the construction costs, mark-ups and premiums will be avoided between the participants of the project team using a business structure like this compared to a traditional design-build contract. By organizing as a general partnership with a shared liability, Veidekke (which normally would act as the main-contractor in a design-build contract) will avoid mark-ups and premiums towards the participants costs in the partnership.
- The participants will have a bigger sense of ownership to the project and the development. The team consists of highly skilled and knowledgeable people, each with their own expertise, which together will create a company culture that continuously challenges each other on a professional level, as well as in the working processes.

Furthermore, OBOS/Ulven AS will enter in a contract with Team Veidekke DA based on NS8407 (design-build contract standard) where Team Veidekke DA operates as the main-contractor. The partners in Team Veidekke DA have separate contracts with each other based on NS standards (NS8401, NS8402 and NS8417), while participants not regarded as partners in the partnership will be contracted under Veidekke as sub-contractors. The ownership share of each partner is based on the contract sum with the partnership. Estimated distribution of ownership shares are; Veidekke ~85%, ORAS ~9%, LPO ~2,5%, and the remaining partners at +-1%.

4.3.1.1 Governance and daily management

The partners meeting will be the highest corporate body of Team Veidekke DA and will have an annual meeting or at the request or need from either of the partners. A steering committee will be appointed as the company’s decision-making body for the most important issues brought in by the project manager. The project manager is appointed from Veidekke and will maintain the communication with the project owner, tend ongoing tasks and the handling of contracts and contractual agreements.

The governance within Team Veidekke DA is illustrated below:

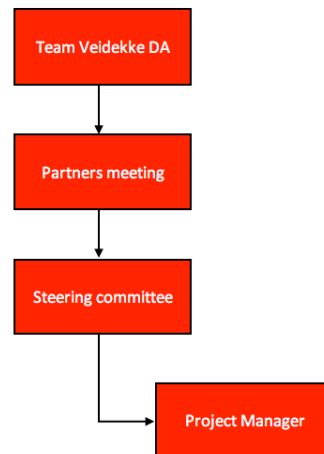


Figure 8: Illustration of the governance within Team Veidekke DA

4.3.2 Proposed solution: “The Secret Garden”

Team Veidekke DA proposed their concept “The Secret Garden” as their solution to the innovation contest. Some key aspects of their concept are presented here.

4.3.2.1 Green areas and an environmental perspective

Together with the development of the residences, the solution proposes green outdoor areas that provides generous surfaces divided in specific areas, access to the sun and good views, possibility for growing vegetables and other food, and a place with human qualities.

The solution includes a large and coherent common courtyard with almost 6000m² of space that includes pergolas, attractions for the children, a 10m long trampoline, a park for various activities, informal refuges, a hill for sledding in the winter time, and a rich and lush vegetation. There will be both public and private rooftop gardens with small and secluded “oases” as common zones as a part of several lounge areas around the buildings. The apartments will have balconies/terraces which covers the facades, where the residents may enjoy the view and relax in peace and quiet.

The landscape plan is developed with a biological diversity, with a flora that both humans and insects/birdlife will enjoy. The outer facades include resistant woodwork on the inside and maintenance-free materials like bituminous tiles on the outside which contributes to sustainable buildings with a low degree of maintenance. The buildings will use central heating as energy source and project team is working on trying to use excess heat from the surrounding industry facilities as a complementary energy source.

4.3.2.2 Rationality - Using modules as “building blocks”

The project is built using components that can easily be configured in different ways. There are three overriding “building blocks” that can be combined in several different ways and be customized to each size of the properties. By using few elements and details in the construction phase the projects becomes very rational and economical. There are for instance only two types of windows, two types of doors towards the balconies, two types of bathroom cabins and one type of kitchen. This way of using the modules and “building blocks” makes the project very flexible with regards to supply/demand, variation in size and variation in economy.

Rationality is the key to achieve high-quality residences at manageable costs which can realize the dream of owning a residence for many people. The modules enable the project team to develop an efficient project with savings in both the design and construction phase, which increases the overall productivity and progress. A key aspect throughout the project has been to facilitate an effective and pain-free process for the developer and the municipality through the construction process. Having this focus is believed to help the authorities in the municipality to process the framework application and permits for commissioning and operation in an effective way to avoid the typical delays and costly disagreements. The key to accomplish an efficient construction process is, according to Team Veidekke, having mutual respect and trust between them as developers and the municipality. This is achieved through their project by extensive use of Building Information Modelling (BIM) to enhance the understanding, and the fact that they have treated the planning regulations with respect so that there is only a need for a few, harmless applications for exemptions.

5 Results: Summary of Interviews

This chapter will present the results of the interviews with the various consultants of Team Veidekke DA. The results of the interviews are presented as summaries, and the corresponding transcripts for each interview can be found in appendix B-F. Key findings from the interviews will be presented at the end of the chapter and further addressed in the discussion in chapter 6.

5.1 Summary interview 1

The company this consultant is working for has a few percent share in Team Veidekke DA. He says that the consultancy firms naturally have a lower ownership share than the contractors that are providing materials and manpower for doing the construction. The consultant argues that even though their share is low percentage-wise, it is inflated compared to the value added and provides a potential economical upside if Team Veidekke DA does well in the project.

The consultant mentions the Ulven B2 area and the associated innovation contest as a potential entry ticket to the rest of the Ulven development. They took into account the possible long-term relationship with Veidekke and OBOS when deciding to take part in Team Veidekke DA and the innovation contest and described this as the “carrot” of organizing to deliver a project in such a way. The consultant clearly says that there are long-term incentives in this collaboration form, where they look further than just the Ulven B2 project and the opportunity to repeat and streamline the Ulven development as a whole.

The consultants from this company are working on a cost reimbursable contract up to a budgeted price ceiling, where if the costs of their consultancy work are less than budgeted it will be treated as a gain for Team Veidekke DA. The consultant says there are definitely additional incentives in this collaboration form, where the most prominent incentive is to have Team Veidekke DA become successful for them to be able to be successful, since the gains or losses are shared. The consultant also highlights some of the fundamental flaws with traditional project delivery systems, where they are working on traditional hourly rates or fixed price contracts, and the misaligned incentives these provide. In a traditional design-build contract, the consultants are pushed hard on price due to the competition to even get in the position to collaborate with the contractor. The consultant goes on to say that when you are pushed on price like this you may be left starting the design phase with the only incentive of doing “as little as possible” to be able to return a profit. Often, the case with traditional project delivery systems is that the different actors involved ends up trying to salvage their own economy because of a misalignment between scope and price. The consultant also describes this collaborative way of organizing as inspirational in the daily progress, and that it incentivizes to propose better, smarter and more rational solutions across different disciplines during the design phase.

The consultant says that the risks pertaining to an eventual shared loss were assessed beforehand. The consultancy firms are used to the traditional contracts which does not involve taking on risks like they are doing in a collaboration contract like this. However, after having a dialogue with Veidekke about the possible risks, they decided that the risks were something they were able to live with and that the risk of losing a substantial amount of money was very slim. Naturally, the risk is depending on the size of the share in Team Veidekke DA which also limits their profit opportunities. The consultant emphasizes the fact that it is to their advantage to work in such a way that that Team Veidekke DA with Veidekke as the major participant does well economically.

The consultant points out that, in his opinion, the biggest difference with this way of delivering a project is the way they and the other consultancy firms are recognized by Veidekke as an equal partner. He says that it is a different environment in this project, where instead of being treated as a subcontractor as with traditional project delivery systems, they are now met with a bigger understanding of their needs and challenges. He says that the governance feels more horizontal in this project organization, and that it gives them incentives and motivation to be creative and to find the best solutions, both technically and financially. The consultant also points out that there is closer collaboration in all types of projects these days, and that there are not any particular big differences in the way they do their daily work in this project. One difference might be the innovation contest, where he says that they worked very closely together before they were awarded the contract.

The consultant says that the importance of a project for their company depends on how economically important it is, but also how important it is for building business relations with other actors in the industry, and to be able to be positioned for future contract opportunities. He says that the Ulven B2 project is the only project where they have an ownership share through a collaboration contract, and that it will definitely be prioritized in case of a shortage on resources. This is because the Ulven B2 project is considered very important for them since it is the first project with Team Veidekke DA, and success in this project will most likely lead to further housing projects with OBOS.

The consultant mentions that there is with no doubt a high level of conflict in the design-build space in general. As previously mentioned, the consultancy firms are considered subcontractors rather than consultants in traditional design-build contracts. Conflicts between the consultancy firms and the contractors seldom go to legal disputes the consultant says, since the main contractor usually has much more power over the consultancy firm in terms of economic muscles. He says that taking conflicts to legal action is out of the question in most scenarios. As a consequence, the consultants feel that their economy and the processing of changes are being intentionally trimmed in favour of the main contractor, exactly because they cannot stand a chance against them in an eventual legal dispute. He points out that this is not something that they have experienced with Veidekke, and that the Ulven B2 project so far has not had any particular conflicts and most definitely not any legal disputes.

On the question of what the most important incentives for him as a consultant in a construction project are, the consultant responds that for them it is recognition. He goes on to say that the way they work and that their position as an equal partner has been recognized by the other participants have been very important for them in the Ulven B2 project. He also points out that this is something that has been lacking in other collaborative design-build contracts and traditional project delivery systems. He says that since they are a specialist company, they are proud to provide employees with a lot of expertise and skills. The consultants say that while the recognition has to be reflected economically in the contracts, it is important for them to be respected, that their advices are heard and that there is an understanding of the complexity of technical systems from the contractor. He emphasizes that it is very pleasant to work under such a collaboration form with a project organization built on recognition and respect between the participants, compared to traditional design-build contracts where the environment often becomes hostile and competitive, with hard demands on progress and deliveries, and a lot of focus on contract. The consultant also agrees to that the non-financial incentives are underrated compared to the financial incentives and has never before experienced such focus on the relational aspects in the project organization. He says that the ability to get to know the people of the project team on a personal level creates a commitment for everyone to deliver better quality, reduce costs and deliver on time.

The consultant says that Team Veidekke DA has a close dialogue with the project owner, which is controlled by Veidekke. He says that the project owner is not considered as an opponent or competitor in any way, and that a key factor for the success of the project is the ability to create a cooperative relationship with the project owner that can land them contracts for future projects. He points out that the project owner is interested in achieving the 20% reduced construction cost which was one of the criteria the innovation contest was won upon, but also interested in the proper quality of the delivery. The consultant says that the key to achieving the 20% reduced construction costs is solely due to the collaborative project team and the ability to come up with rational solutions through a rational form of collaboration. He mentions the collaboration between the architects and the other technical consultants in the design phase as an important thing to be able to avoid many of the irrational designs that are often the case when using traditional project delivery systems. He says that there are too many housing projects that fall in the trap of designing too complicated architectures, which makes them very little rational to build. The consultant continues by saying that with the Ulven B2 project, everything is turned upside-down, where Team Veidekke DA as a main contractor is given the freedom to organize and execute the whole design phase to achieve the lowest possible cost of construction. He says that the design is rational but not boring, and that because of the way they have been collaborating they have been able to optimize the design without sacrificing creativity and excitement. He also says that there usually is a mismatch between the architects and the technical consultants, where the technical consultants try to convince the architects to design more rationally. He says that Veidekke has been very helpful and communicated this rationality from the start.

The consultant finds the collaboration model used in the Ulven B2 project as adequate for this type of industrial housing project. He emphasizes that the “collaboration contract” has

become a loose term in the industry, and usually it is used as another word for a design-build contract. He says that there are different approaches to more collaboration and integration, and that they all have a varying degree of collaboration until they end up as a traditional design-build contract in the end. He says that, from his experience, there are both healthy and unhealthy collaboration contracts out there, but that the collaboration phases are often exploited by the main contractors to get early access and to sway the project owner into making changes that benefit the contractors. He says that there might be misaligned incentives between the contractors and the project owner in the different types of collaboration contracts, where the contractors use the collaboration to get early access in order to negotiate an exclusive price.

5.2 Summary interview 2

The company this consultant is working for has less than a couple of percent ownership share in Team Veidekke DA and has three to four people involved on the project at this moment. The consultant is working on a contract type with hourly rates with an upper cost ceiling in addition to the shared gains/losses incorporated in the collaboration contract. He also says that this is the most common contract type he has been working with, where the other one being fixed price contracts. He says that the hourly rates contracts are most favourable for them, arguing that it gives them more freedom for collaborative effort and that it is an easy and fair approach where you are paid for the work that is being done. The consultant continues by saying that they have been involved with fixed price contracts as well, and that their experience is that they rarely earn any money on these contract types. He thinks this has to do with their pricing of the contracts, which is too modest and that they are not good enough at calculating the risk premiums for the fixed price contracts. He also says that the different contractors and project owners usually has different approaches and preferences, which makes it even more difficult to price the fixed price contracts.

The consultant says that the equity share of Team Veidekke DA is represented by a reduction in the hourly rates they charge in their contract. He says that by using a general partnership with shared liabilities like they do here on the Ulven B2 project, it provides a model that is based on trust. He feels that in such a model, where they are supposed to do things smarter, faster and more innovative, a compensation format based on hourly rates is the optimal contract and that they should be able to trust the consultants not to spend more time and resources than they have to. He says that there have been instances with previous projects where they have exceeded their budget, and that this influences the whole project in a negative way. He also thinks that for projects like the Ulven B2 project, the process is very important. That the collaboration process feels fair and realistic towards them. He also points out that the consultancy firms have a whole different business model than the contractors, and usually a very different liquidity situation. He says that the cost of salaries is their biggest factor, and that they are totally dependent on money coming in every month to be able to sustain the business.

Regarding the risk of sharing a potential loss, he says that they did calculations and studies on what their risk tolerance was compared to their potential share of Team Veidekke DA. He says that it was important for them to have a large enough share to make this interesting economically, but low enough to be able to accept the risk of a potential loss. He says that the trust towards Veidekke, and the way they were going to run Team Veidekke DA, was absolutely necessary before agreeing to be a part of this collaboration contract, since they are not prepared to take such risks by themselves.

While talking about trust as an essential aspect for the success of the collaboration, the consultant did not agree that the relational aspects were more important than the financial aspects. He emphasizes that it is important that the relationship between the different participants of Team Veidekke DA is regulated in a proper way in the contract, so that the collaboration becomes as predictable as possible. For the Ulven B2 project in particular however, he says that the financial incentives were not that important. He says that they did not know for sure how this type of shared gains and losses might affect their profitability and that their ownership share was probably too low to be able to produce any substantial profits for them. He says that the relational incentives weigh up the most for this project, that it was professionally exciting to be a part of a new collaborative approach to project delivery and that they believed this could perhaps be a model for the future.

The consultant says that the start of the design phase of the Ulven B2 project has been a good experience so far, while there have been some challenges in understanding the different parties' business models and to learn to know each other. He says that the contractor sector and the consultancy sector are very different from each other, and that even the various consulting disciplines are different in many ways. However, he says that all the consultancy firms have the same business concept, which is selling consulting hours. He says that currently things are looking good, but that there are of course some minor problems along the way, considering this is a brand-new way of working together for everyone, that they are figuring out how to regulate this in the contract. He says that it will be important to see if this collaboration form can remain fair and that the consultants will not end up getting squeezed by the other major participants. He points out that so far, the Ulven B2 project has not been good business for them, considering the discounted hourly rates and level of effort required in the innovation contest. However, they believe the long-term rewards, like an increased order backlog, will be worth it in the end.

The consultant says that they work both on design-build contracts with the contractor and directly with the project owner, maybe half the time with each. He says that the project owner has had clear visions for the Ulven project, and that the project owner has had both general and more detailed constraints. The details regarding the project up towards the construction phase has not been communicated that much yet, but that this is something they hope they will see more of as the project progresses. He does point out that this might be one of the challenges related to this collaboration model, that while the contractor and the consultants are integrated better, the project owner is still on the outside of this integration. He says it will be interesting to see what the consequences of this might be towards the project owner and the

project itself and how this might affect the end users. While he is not sure whether or not the project owner should be included in the collaboration contract, he can tell that there are most likely advantages and disadvantages with both options, but by leaving out the project owner they might experience the feeling of being on two separate teams. He says that this way of thinking, where you consider yourself on either “team”, is a problem that often arises in design-build contracts. He also points out that the only stakeholder that is not properly safeguarded in the collaboration contract is the end user, where the consultants that are the ones that usually deal with both perspectives at the same time, are now on the contractor’s team instead of the project owner’s.

The consultant says that the big difference with this project delivery system regarding the design phase, is the way the process flows. He says that this collaboration form provides more respect for each other’s disciplines instead of creating a competitive environment, and that the people involved in the design phase are working more closely together. He emphasizes that projects become very personal and depends on the persons involved. Hence, he says, that this collaboration form provides several advantages towards better designing over the traditional ones. He says that from the consultant’s perspective these aspects might be underestimated compared to the focus on profits and costs, and that his experience is that these projects are all about the process. The consultant points out that this is something Veidekke has had a lot of focus on for many years, recognizing that a consultant’s services are not something you buy off the shelf but rather something you search for. He also says that the big contractors in Norway tend to handpick consultants, subcontractors and suppliers more often.

On the questions about how the Ulven B2 project is prioritized compared to other projects, the consultant says that the Ulven B2 project will never be given a lower priority. He says that the fact that they have an ownership both through shares and being part of the team, the long-term collaboration and that they feel they are an important part of the team, will always make them prioritize the Ulven B2 project. I went on asking if this project delivery system could be bad for the overall competition in the industry, where handpicking and long-term relationships are important factors. The consultant does not agree to this, for many reasons. He says that they have a limited capacity as they are a small office and that they want a diverse portfolio of projects. He also points out that Veidekke and the other big contractors have been working like this for many years already, handpicking consultants and subcontractors to create dedicated teams. They also sometimes hand pick several consultancy firms that have to compete for the contract. He also says that it often is up to different project managers how the tender process is done.

The consultant says that there have not been any particular conflicts so far, and that the consultants have a close and good collaboration that is working out well. He says that things like design errors and execution errors will most likely happen in this project as with every other project, but that they will be much better prepared to solve these problems and the potential conflicts that may arise from them through their collaboration model since they are working so closely together. He continues by saying that it is important that the consultants are not squeezed too hard on price, and that one of the primary reasons for conflicts in the

design phase of other projects is that the consultants run out of money on their budget and you start pushing work on others. This leads to people blaming each other and creates a hostile environment he says. He says that it will be key to the collaboration that the proper foundation is in place, that everyone has the appropriate budgets and allocated resources so that everyone has enough room to do their work and are paid accordingly. He says that the purpose is that they are supposed to work more effectively together, thus reducing the number of hours required.

The consultant says that they are working under the standard contract NS8401 “General conditions of contract for design commissions”. He says that the optimal contract type for them would be remuneration on the basis of actual time taken without any price ceiling, and to have the delivery constantly defined. He says that the advantage for them would be that it is fair and tidy, even though they would not have the opportunity to earn more than the gains from selling hours. He says that they have worked on fixed price contracts that has worked out quite well in the past, but that it ultimately comes down to being paid for the hours they work.

5.3 Summary interview 3

The consultant says that they have completed the initial design and delivered the general application of the framework for the project, but not yet started with the detailed design. He says however, that the initial design of the Ulven B2 project has been in many ways more detailed than normal initial design phases, this is mainly because of the collaboration model. He continues by saying that both contractor, consultants and architects collaborated closely on the innovation contest that landed them the contract, where a lot of the people that usually comes in later in the design and construction phase were involved from the start. This has lead them to be ahead of what they usually are on many areas before sending the general application. The consultant says this is the first time he has been involved in this type of collaboration, and that the process has been working really well so far. However, he also says that they have been working much more and have been putting down many more hours in the innovation contest that what they would have been in a traditional tender process. He says that they have taken on more risk than usual, and the work done in the innovation contest is almost considered as “free” work considering the small symbolic amount of money compared to their self-cost.

The consultancy firm this consultant is working for has somewhere between one and two percent ownership share in Team Veidekke DA. He says that they had to consider the risk pertaining to the uncertainty of how many hours they needed to contribute in the innovation contest, which could result as a pure loss if they did not win the contract. He says that the collaboration contract gives them the incentive to work in such a way that Team Veidekke DA is profitable, since the gains are shared upon all the participants.

The consultant says that the collaboration between the different disciplines in the design phase has been very good. He says that this is an aspect that is working out quite well

regardless of the collaboration model, but that it has been definitely beneficial to involve the other consultants earlier in the design phase. He says that they avoid a lot of redesigns and solutions of less quality with this early integration, since the different disciplines can fit their specifications with each other's solutions at the very start. He further agrees that early involvement of different types of consultants can help prevent changes and provide better solutions, as well as save the project potentially a lot of costs. He also says that if you have to redo the design later on, the solution will most likely be of less quality since more of the building design is locked in.

The consultant says that they are working on a contract type with a fixed price ceiling, where they are paid by hourly rates up towards that ceiling. They will also not be compensated for the costs that exceeds this ceiling, and the consultant says that this contract was something they and the other consultants negotiated within Team Veidekke DA. He says that he has a hard time picturing how the contract type could be different in this particular collaboration model, and that they would of course welcome an hourly rates contract without any price ceiling but understands that this would not be viable for the project. He also points out that this contract type combined with shared gains/losses is quite unusual for them, that cost savings on their part will be part of the shared gains and not directly to themselves. This demand some degree of trust between the different participants he says, that everyone works in a way to save costs and contribute to the shared pool.

The consultant says that it can be quite hard to set a price on contracts for the detailed design of a project. He says that it is often just a few pages which specifies some limitations in the design, and limitations on number of drawings or meetings for instance. This makes it very difficult to define what is part of the detailed design in the contract and what is defined as a change that will incur additional fees for the project owner he says. He experiences these things as difficult, and that it might be part of the issue with the design phase. He says that they have solved this in the Ulven B2 project by voicing concerns together within Team Veidekke DA. He says that if the request for a change comes from the project owner it can be considered a change in the detailed design, but all other alterations must be considered a part of the detailed design. He continues by saying that this demands loyalty between the participants of Team Veidekke DA, that they discuss the issue of alterations to the detailed design together and decide how to cover the costs in fair manner.

The consultant has experienced the project owner's involvement as very traditional so far. He says that they are usually teamed up with the project owner in the design phase of traditional projects, and that this way of organizing with the contractor from the very beginning is a new experience for them. He says that this might lead to the project owner losing some sense of ownership towards the project, and that the lack of involvement might cause the project owner to be more sceptical towards the design. He does not feel that he has a bigger sense of ownership towards this project compared to traditional projects, but that it is easier to work with the contractor from the start. He says that in traditional projects, where they work with the project owner in the beginning and the contractor later on, they might have a divided loyalty. In traditional projects they may find themselves policing the contractor on behalf of

the project owner to maintain the proper quality throughout the later phases, he says, and that this way of delivering a project makes it easier because the contractor is on the same page regarding the quality from the start.

While the ownership share is low in terms of percent, the consultant says that it constitutes a big investment relative to the size of their company. He says that the reason that the consultancy firms have lower shares compared to the contractors, is that the cost of design is much less than the cost of construction. He says that they have invested relative to the cost of design, and that since the investment represents a major part of their activities the Ulven B2 project is considered an important project for them. He says that he is the only person from the company currently working on the Ulven B2 project, but that he imagines that there will be up to three people working full time on the project for the next year. Regarding the question about prioritization, he says that while they have not thought that much about the shared gains/loss they have been allocating specific people on the project that has the sufficient experience and expertise. He says that they want to make sure to do this right, to get the proper experience and references.

He says that the long-term relations from this collaboration project are valued highly and considered the primary gain for them from doing this project. Even if they would not have won the innovation contest and gotten the contract, it would have resulted in valuable network effects he says. The consultant also says that since Veidekke handpicked the participants for this collaboration, turning the offer down was merely an option for them considering that Veidekke is an important contractor for the consultancy firms. He says that there are definitely other incentives than the financial incentives in this project, especially future work relations with both Veidekke and the project owner.

The consultant says that there have been some minor conflicts between themselves and Veidekke, specifically on the issue of quality versus costs. He says that they have had some “tugs of war” to find the balance between these two aspects, where they often advocate for solutions that provides more quality while Veidekke is often interested in finding the most cost-efficient solutions. He points out that they have been aware of the fact that the project owner requested a 20% reduction in construction costs, and that most of the innovation is related to cost savings, but that there also is a limit to how much one can save on costs without it affecting the quality of the delivery.

The consultant thinks that fixed price contracts are better for them than hourly rates with a ceiling. However, he says that a contract with purely hourly rates and no price ceiling would be the easiest for them, and that they have worked on these contract types at least in the predesign phase of projects that involve a great deal of uncertainty. He also says that it is no problem having a cost frame or price ceiling, as long as it is implied that you communicate when you are able to reach the ceiling and that you can have a dialogue to reassess how to proceed. He can also say that he has not had any experience with contract types that has incorporated incentive fees or similar but recognizes that this could be a smart thing to have in the compensation format. He also says that the contract type definitely can influence the day-

to-day work of consultants. He does not believe he has ever thought of doing the work on a fixed price contract quickly to get more profit, but that it may be more evident if you reach the price ceiling of hourly rates contracts and realize that further costs will not be covered. He says that there are no incentives for working for free in traditional contract types. He points out that it may be some incentives for working for free in the Ulven B2 project since the gains and losses are shared and that they will be affected as well. However, he says that this would probably be discussed within Team Veidekke DA, to see if they collectively can cover the costs of doing extra designing that might benefit the project in total.

The consultant finishes the interview by emphasizing the importance of interpersonal relations. He says that the collaboration process is very dependent on the persons involved, and that it is important to create a cooperative and friendly environment to make it work.

5.4 Summary interview 4

The consultant starts the interview by saying that it is positive that someone is trying to ask these questions about project delivery systems and incentive-based engineering contracts. He says that all of them, the consultants, the contractors and project owners, have a common interest in trying to understand each other's income models and mind sets, and to try to understand their own incentives and motivations. He says it is interesting to have a discussion on what engages the people involved in projects, and how to keep them engaged throughout the project's lifetime. He points out that he likes the approach of Veidekke, where on the Ulven B2 project they have realized the relational aspects of the contract. He says that contractors are used to optimizing the economy of projects by buying separate elements as cheap as possible, and that this way of thinking may spill over to the procurement of consultancy hours. This will not be good for anyone in the end he says, and that Veidekke does the right thing in having the relational aspects of the collaboration in focus.

The company this consultant is working for has less than a couple of percent ownership share in Team Veidekke DA. He emphasizes that this is very little, and that this is a part of problem regarding this collaboration model, and the incentives the shared gains/losses give to the different consultants. He says that with such a small percentage share in Team Veidekke DA, you naturally will need to have a very big profit in order to provide them with any significant gains. The consultant points out the key issue with this low percentage share that they have by giving an example; If they come across an idea for a change or alteration in the design that might save the project overall costs, they might not be incentivized doing this idea if they are close to their price ceiling that was budgeted beforehand, since the self-cost of the effort needed to evaluate this idea might be much bigger than the share they would profit from the overall cost savings. He says that this creates a paradox, where the model is interesting in principle because it underpins common goals, and that if Team Veidekke DA saves costs they earn money from the shared gains, but that the flat distribution based on percentage shares might not justify the individual effort in many cases. He says that it might feel like the consultants are being "exploited" by Veidekke, to save costs that they will benefit the most from because of their big percentage share in Team Veidekke DA. However, he does point

out that this might go the other way as well, where in many cases Veidekke can save huge costs on procurement because of their network of suppliers, that the consultants will profit from without doing a thing.

The consultant says the paradox that appears in the collaboration model creates a need for trust between the different parties involved in Team Veidekke DA, that each are loyal towards each other and do their part. He says that the aspect of building trust and loyalty towards each other has been very good in the Ulven B2 project, and that Veidekke has involved key people to maintain the motivational and “human” aspect in the project organization. He also points out that another element of the Ulven B2 project which cannot be left out, is that the consultants expect to be able to build a long-term customer relationship with Veidekke that is a big actor in the industry. He says that this means there is a relational incentive in this collaboration contract as well, and that this works as a big motivation for them. He also points out that they hope to be preferred for future contracts, with both Veidekke and the project owner, if the Ulven B2 project is successful and the collaboration model proves to be attractive. He emphasizes that this project is not some kind of dream that is supposed to secure them some exclusive rights for future projects with Veidekke, but that the most important thing for them and their engineers is to be able to succeed with this collaboration form, which is a feat in itself. He also emphasizes the fact that the impact on the project is down to the individual consultant they are using on the project, and the ability they have to collaborate with the other parties in Team Veidekke DA that will define the success. He has already heard from the consultant they have dedicated to the Ulven B2 project, that the collaboration and the relational part is actually working really well so far.

Compared to traditional design phases, the consultant can say that the main advantage is the early integration. He says that they have never been involved this early in a project before, and that it is important for the project that they can work together with the architects in particular from the very start. Another advantage from the early integration is that they do not have to rely on evaluations and assessments from the predesign of other consultants, since they are part of the predesign themselves he says. He continues by saying that by integrating the architects and the other consultants this early you get to focus on how to both design effective and build effective, which are both very related. He says that the architects may often have mixed feelings about the more rational designs, and that you can avoid creating a hostile environment by finding the balance on this in the design phase. He says that this balance is important because you need to safeguard the end customer’s interests as well in a project like this where the apartments are to be sold on the market.

Regarding the fact that the project owner is not part of the collaboration contract, the consultant says that he knows little about their involvement. However, he has heard that there have been some scuffles between the project owner and Team Veidekke DA, and that there has been some frustration. He says that it is important that the project owner stays true to the concept of the innovation contest and the collaboration model, where Team Veidekke DA maintain their freedom to manage their own decisions.

The consultant says that generally the experience so far has been that it is very positive to be integrated from the very start, as well as having a big focus on team building and creating good relations between people. He says that it is nice to have this much focus on the soft side of the organizational model, and that it has not been all about contract and economy. He says that the signals so far are that collocation of consultants is a good thing. The idea is that they are going to work with an optimal usage of digital tools in this project, but the consultant says that it is important to remain pragmatic and not do a whole lot of different things just because they seem innovative. He says that you have almost endless abilities when it comes to details in the models, but that you sometimes need to decide what information you should include since the value might not reflect the effort needed to incorporate it in the model. He says that in the Ulven B2 project they have been very good at designing modularly and optimizing all of the repetitive functions and solutions. While they much rather want to work on the creative parts of the design than copying modules of apartments, they are on board with this way of thinking and it has reduced the costs of design for them as well he says.

The consultant says that they are used to work on both fixed price and hourly rates contracts. He would say that fixed price contracts are most common towards them on this type of projects, but that it depends on which phase of the project they are working on. He says that if they are working for the project owner in a preliminary phase of the project to create a basis for the tender of a design-build contract, they would might be on hourly rates with a budgeted price ceiling instead. Most commonly however, they would be on a pure fixed price contract when they are involved through the contractor in the detailed design phase. He says that the contract type depends on the uncertainty, and that they have worked with other variants like a target price contract where they receive a share of the difference between actual price and the target price. He says that the main problem for them is to price the contracts correctly and to properly evaluate the risks involved. He says that the contract in the Ulven B2 project, where you have hourly rates up to a price ceiling and the saved costs of using less hours ends up in the shared gains, works like a fixed price contract in many ways for them.

The consultant says that for the Ulven B2 project there is a certain focus from the top management that they succeed. He says that the project is prioritized by them mostly in the way they picked the right people to work with the project and how they are able to keep them motivated. He understands that it is easy to think that consultancy firms might be selective in the way they allocate employees to different projects, depending on the project and the contract type, but that this is not how they feel the case is. He says that it all comes down to the timing. They do maybe around 100 projects during a year, and it is often very coincidental which people are allocated where he says. He points out that the only real danger of finding themselves in a dilemma regarding priority, is if the project comes to a prolonged halt. He says that it is not only important for the economy of the consultancy firm to have their employees constantly engaged on projects, but also important for the employees themselves. The consultant says that if you ask their employee that is currently working on the Ulven B2 project, he would say that there is a bigger loyalty towards the project team and the project itself compared to traditional projects. He says that this would be because he has been involved from the very start and been able to add this as a good experience and helped him

with his development as a consultant. The other consultant agreed that there is an ownership beyond the percentage share of Team Veidekke DA, where the individuals involved get a sense of ownership through their involvement and collaboration. Both consultants think that the percentage share of Team Veidekke DA has less effect than the actual collaboration and its process. The consultant says that it is the relational aspects and the motivation and challenges that makes people thrive at the workplace, not the salaries even though these need to be in order.

Regarding conflicts and potential legal disputes, the consultant says that they have not taken that much consideration so far since the overall design-build contract with the project owner is not yet signed. He says however, that generally there are many issues in the Norwegian construction industry that are characterized by legal disputes. Disagreements surrounding number of hours spent by the consultants or notifications of change or deviations are two examples that are unfortunately associated to legal disputes the consultant says. He says that he is not entirely sure how these issues have been addressed in the collaboration contract in Team Veidekke DA, but that it has been discussed on a general basis and that they have used the standards for consultancy contracts when they gave their offer.

The consultant says that they have used the NS8401 “General conditions of contract for design commissions” when giving their offer for the job. He also says that Veidekke has been very clear that they cannot exceed their budget except for additions or changes that either; A - can show that the money needed is reflected in the saved costs of the project for doing the addition or change, or B - can take to the project owner and say that they have to pay for it. He says that for option A you can have the paradox that was mentioned earlier, where you make the wrong decision because it will not be profitable for yourself even though the decision would be profitable for Team Veidekke DA overall. The consultants argue that it could be better to have some kind of pool in addition to the shared gains/losses that could cover the costs of making beneficial evaluations and changes that exceeds each parties budget. They say that innovation is something that takes place in two phases, where you first have to spend resources on evaluating whether or not a solution might be beneficial for the project before spending more resources implementing that solution. They say that the project might miss out on potential beneficial decisions because the consultants are not incentivized to do the voluntarily evaluations when they do not have a strategy for covering the self-cost of these evaluations.

The consultant reiterates the paradox we were talking about earlier and gives a scenario where they for example might spend 1M NOK to evaluate and implement a solution that saves the overall project for 10M NOK. He says that this would be a reasonable decision to proceed with, but that it would be unjustifiable for the consultant since they would only receive a couple of percent of the 10M NOK saved and have a self-cost of 1M NOK. He continues by saying that they need to have a discussion on how the shared gains/losses are distributed among the participants if this model is to be successful, because in a worst-case scenario one discipline might end up with a huge deficit compared to the others. The consultants also discuss whether the effort required by the contractor to provide cost savings to the overall

project can be compared to the effort required by the consultants, regarding the self-cost of the effort. They say that Veidekke can provide tremendous cost savings for the project through bartering prices with their suppliers, but that they might not be faced with the risks of wasting resources on evaluations that leads to nothing, like the consultants might face. They also ask if this is considered as within the scope of Veidekke or if it is something extra for them as well. However, they both think that the problem is not necessarily about the ownership share for each party, but rather the cost coverage of the innovative efforts that might lead to decisions saving costs for the overall project. They also talk about the other side of the issue, that if you start covering the costs of these innovative processes people might start suspecting each other for exploiting it to create room for yourself to demand changes and additions in the contract. The consultant agrees to that it might be difficult to value a consultancy firm's resources towards a contractor's resources in terms of equity in Team Veidekke DA. He says that Veidekke has around 80% ownership share in the company, while having relatively few people involved they have the responsibility of procurement and construction which amounts to very big values.

The consultant says that changes agreed within Team Veidekke DA will not be considered notifications of change subject for additions in the design-build contract towards the project owner. He says that they could employ a similar strategy within Team Veidekke DA, where they treat such changes as if they were regular notifications of change and decide how deal with them regarding costs. He also points out that the handling of changes is a factor as well, where the timing of decisions of doing evaluations is very important, where sometimes it might already be too late and other times it may affect the progress in a negative way. He says that good leadership through the project manager is key to make the correct decisions regarding changes and alterations in the design phase. He says that a collaborative project organization is all about creating commitment through trust, and that the organization, and especially the management, need to be aware of that through their leadership style. He says that it is a very good start to be able to work with the best tools and the best people along with the idea of working so closely together. The consultant summarizes by saying that this collaboration model is good in a lot of different ways, that it creates a lot of enthusiasm towards common goals, but that the distribution of the shared gains/losses as well as the cost coverage of innovative efforts should be discussed further. Fairness is the keyword he says.

5.5 Summary interview 5

The company this consultant is working for has less than a couple of percent ownership share in Team Veidekke DA, which represents the value of the contributed hours from him to the project. Veidekke and his company has negotiated an agreement that is based on a 100% position on the project that constitutes a certain number of hours of work. He says that his contract involves a negotiated hourly rate that covers their costs including salary, taxes, etc., up to a budgeted total amount of hours. Furthermore, he says that each consultancy firm has negotiated their own individual contract with Team Veidekke DA, and that none of these are identical but all are approved by Team Veidekke DA. The consultant also says that he is working on other subprojects with the project owner that are not part of the budget for the

Ulven B2 project, where he has a contract based purely on hourly rates. The consultant says he usually works on contract types with hourly rates where there is an estimated budget of number of hours. He also says he has worked with fixed price contracts, and hourly rates both with and without a price ceiling.

The consultant says that the collaboration contract has been working out very well so far. He says he is familiar to working in teams and with collaboration contracts in general and gives an example of an earlier project in downtown Oslo where all the parties were involved in a type of integrated project delivery. This project did not involve a general partnership and shared gains/losses like the Ulven B2 project, but a collaboration in the design phase which involved a target price that set the premises for the rest of the project. He says that this particular collaboration form helped expose hidden costs, as there was continuous communication between the project owner and the contractor. He points out that the contractor in many cases might not feel committed to communicate certain opportunities for cost savings to the project owner. He says that under traditional tender processes when a project owner specifies something, you as a contractor give the price for that which was specified even if you see other solutions that might be more efficient cost-wise. He says that closer collaboration creates more freedom and room to make the right decisions, and to deliver a project that is both cost efficient and of good quality.

The consultant says that it is a very clear disadvantage that the project owner is not part of the collaboration contract in the Ulven B2 project. He says he notices this now during the project since he usually works very closely with planning authorities, public agencies and regulations. He says that the project owner may feel that this part is problematic, since they are used to do their own project management and have their own communication with the planning authorities. He says that with a collaboration contract that excludes the project owner like this, the project owner might feel that they are losing control over the project. There is also another area of the Ulven development that is using a traditional project delivery system, and the consultant says that the Ulven B2 area has surpassed the Ulven B3 area in progress. He says there could be many reasons for this, but that the collaboration contract could be one of them. He also says that the project owner showed interest in how they were doing things on the Ulven B2 project, that they wanted to try some of the same approaches as they were doing. Furthermore, he says that the project owner represents yesterday's customer so to say, and that they have been challenged by the management of the project owner to anticipate how to build for the future. He says that closer integration of the project owner would be an advantage to avoid an "us vs. them" scenario and to avoid suspecting each other's decisions. He says that these are things that have been discussed with the project owner, but that the progress has been to slow so far much because of them having to deal with the planning authorities. This is the first time he is on the contractor's "side" and says that he does not feel like Team Veidekke DA and the project owner is on the same team right now. While he does not think it would be a good idea to integrate them into the general partnership, they definitely should be better collaboration between the two sides.

The consultant says that they have never before been part of this kind of collaboration contract, which involves setting up a general partnership like Team Veidekke DA. He also says that they usually do not work with innovation contests like the one for Ulven B2, and that the whole experience is totally new for them as a consulting firm. He points out that they as a consultancy firm works on invoicing hour by hour, and that the innovation contest, which could have been “free” work if they have lost, was considered a particular big risk for them. He says that because of this, they would not have been comfortable with a higher percentage share even though they had the opportunity. The consultant says that while there are shared gains/losses, the biggest risk is that the project ends up not being successful and that they lose out on any potential gains from future projects with the Ulven development. He says that the Ulven B2 project is not going to be profitable on its own, and that the effort will pay off with future projects because of the added volume in their orderbooks. He says that the real gain comes from the synergy effects of having this collaboration on your resumé, and that as long as you are able to have a long-term perspective it will pay off. He also points out that it would not make sense to create a general partnership like Team Veidekke DA for just one isolated project like the Ulven B2 project but having a partnership like this creates commitment towards future development. He agrees that there are long-term incentives in this project, and that the incentives might be more semi-financial or relational rather than purely financial. He also points out that a small share will not amount to any big gains for them, but that this collaboration is more about being part of such a big project. He says that the ownership share could be more financial interesting if they had the ability to involve more people for example.

The consultant says that the collaboration form has helped them land solutions much faster in the design phase. He says that since all the different disciplines of consultants was working together in the early design phase, they were able to dive further into the details and lock down more and more of the design in compliance with each other. He says that this gave them boundaries that sped up the progress, while still giving the consultants the freedom to be creative around these boundaries. He also says that his was probably one of the reasons for them winning the innovation contest, since they were so integrated and thorough in the early design, they were able to give a framework application very early. After the innovation contest, even the realtors said that this was already so specified and detailed that they could almost post it on the market he says. However, he says there were notifications of changes from the project owner after the innovation contest that required a lot of evaluations and redesigning, but that this was considered a change in the request from the project owner. The final design-build contract between Team Veidekke DA and the project owner is not yet signed he says, and that the changes requested from the project owner will be taken into account when they give a revised offer and price for the contract.

The consultant says that they are exploring the process with the collaboration contract and the shared gains/losses along the way. He says that this is a new way of thinking for all the stakeholders involved, and that there are discussions on this particular part of the collaboration. He says that they have had a dialogue with the project owner regarding the different changes so far and made sure that the consultants have their costs covered for implementing these various changes. However, he says that this is not the most complicated

project, and that it is limited how much cost reduction you can achieve in the design phase. He says that the cost savings from now on will be about managing to streamline and rationalize the construction, which is Veidekke's expertise as a contractor. He also says that the design phase constitutes only a small part of the total costs and that it is the construction in itself that includes the majority of the costs, even though the ability to streamline and rationalize the construction phase depends on the design phase.

The consultant says that on a daily basis his loyalty is toward the Ulven B2 project. He says that overall, he experiences increased loyalty towards the project from the consultants, and that some are more used to working like this than others that might need more time to adjust. He also says that the Ulven B2 area will have more rational solutions than the Ulven B3 area, which is delivered by a traditional system, and that the designs for the Ulven B2 had strict limitations which the architects could work around. He says that they have had a good dialogue within Team Veidekke DA and not had any particular conflicts. The only thing that has been somewhat unclear and has needed some discussion, he says, are issues surrounding notifications of change and what is included in the scope of cost that has to be covered by themselves or what is covered by the project owner. He says that these issues have been solved through discussions and dialogue. However, he says there has been some minor conflicts between Team Veidekke DA and the project owner, where they had to clean the air a couple of times. He says that the project owner in many cases have a negotiation technique where they are trying to compress the contractor and using the fact that they have not yet signed the design-build contract as leverage. He points out that this becomes unprofessional in the end and that the project owner should rather encourage the contractor to give a good offer through positive communication.

The consultant says that Team Veidekke DA have taken into account the possibilities for legal disputes in their collaboration contract, both internally and towards the project owner in the design-build contract. He says that there has been given a lot of thought towards this, especially for the digital tools like BIM that is going to be used during the project. He says that since they are working so closely together and will be interacting with each other's digital models a lot, it is important that they have some guidelines and security to avoid conflicts and misfortunes in the digital model of the design. Furthermore, he says that because Team Veidekke DA is using a business structure with limited shared liabilities, the different parties are only liable according to their percentage share in the company. He also says that mistakes and errors in the design are rather solved together than pursued with legal action, and that since more disciplines are involved together it is often easier to discover and fix the various errors that occurs.

The consultant concludes that one vulnerability with this collaboration model is the dependency on individual persons. He says that Team Veidekke DA will not be any better than the persons involved and demands that everyone is dedicated to the project. He points out that the project might face difficulties if there are replacements in the project organization, since this way of working is not yet established, and you may quickly fall back to the old traditional way of thinking if you bring in a lot of new people. He says that it is very unusual

for consultants to work in this way, where you are thinking of the overall project rather than just yourself, and that the important thing is having the people with the correct mindset towards long-term and rational thinking. He agrees to that the success of the project is more about mindset, culture and relations, and that the financial incentives are more aligned with the participants with the big ownership shares while the consultancy firms are probably more in it for the semi-financial incentives.

5.6 Key findings from the interviews

This section will list some of the key findings found throughout all of the interviews.

- The consultancy firms have a very low ownership share (less than a couple of percent) of the general partnership. The ownership share is related to the contributed assets of each partner, where the consultants' assets are mainly hours of work compared to the contractor's physical assets. The different consultancy firms had the option for larger ownership shares but considering their liquidity situation compared to the contractor most of the consultancy firms were not able to take on larger share percentages because of the associated risks.
- The ownership shares and the distribution of shared gains and losses may not create the desired financial incentives for the consultants. It may create a paradox, where the financial gains do not reflect the effort of voluntary contributions. The distribution of shared gains/losses compared to ownership shares should be discussed, especially regarding cost coverage of beneficial voluntary effort to incentivize such behaviour.
- The consultancy firms assessed the risks pertaining to the potential shared loss of the shared gains/losses part of the arrangement and even made calculations and studies for how large ownership share they could risk having.
- The consultants are working on contracts with hourly rates up to a cost ceiling, individually negotiated with the partnership. If the consultants spend less hours than budgeted, these saved costs will be added to the pool of shared gains that are distributed in the partnership. The consultants all think that a contract with a compensation format that is based on hourly rates without any price ceiling would be optimal for them, but they understand that this is not viable for the project owner, or in this case Team Veidekke DA. However, since the collaboration involves a great deal of trust, some of the consultants argue that such a compensation format perhaps should not be that unrealistic after all.
- The consultants identify long-term incentives in the collaboration form, where industry relations, network effects, and further contracts in the Ulven-development emerges as most prominent. The consultants also identify the non-financial incentives as more important than the financial incentives arising from the shared gains/losses in

the contract. Non-financial incentives that are mentioned are for instance recognition, fairness and a friendly work environment.

- The Ulven B2 project has been prioritized by the consultants mainly through allocation of key people in their companies. They all find this project and collaboration important, mainly because of the potential future collaboration it may lead to.
- The project owner has a traditional involvement and is not part of the specific collaboration. This may be a disadvantage according to the consultants and divides the overall project organization into two “teams” – the project owner and Team Veidekke. There are concerns among the consultants on the effect of not including the project owner in the overall collaboration contract, especially for the end user of the delivery.
- There has been a low conflict level within Team Veidekke and the collaboration has worked out good so far. The minor conflicts that has taken place has been between the contractor and some of the consultants regarding the quality versus cost of the delivery, but that these have been cleared up quickly and orderly. There has been some more conflict between Team Veidekke and the project owner, and the communication has been less than good at times.
- The interpersonal relations in the project has been very important for the success of the collaboration, and that the persons involved are essential for how good the collaboration will be. An important aspect is how the individual persons involved are motivated through this way of collaborating.
- The consultancy firms and the contractors have different business models and very different liquidity situations. They may also have different incentives and motivations related to their mind sets and income models.
- The consultants regard the relational aspects of the contract as particularly important in this collaboration and feel that these aspects might be underrated in the traditional project delivery methods.
- Trust and loyalty towards each other are key factors for the collaboration of Team Veidekke DA.

6 Discussion

This chapter will provide a discussion on the topics involved and try to address the research questions stated in the introduction. The different topics of the theoretical framework will be analysed and discussed up against the key findings from the conducted interviews, and hopefully provide some insight to the various problem statements.

6.1 Contract types and their incentives

The literature describes several different contract types within three main categories while the interviews indicated that there are two contract types that are typically used. This section will discuss the theoretical contract types up against the contract types used in practice, as well as discussing the specific contract types used in the case project and its associated incentives.

6.1.1 Contract types as described in the literature

The contract types are sometimes defined by different terminology in the literature. However, the literature seems to agree that there are some main categories of contract types, even though they are coined by different terms. Turner (2007) identifies three basic forms of compensation; cost plus, remeasurement and fixed price. Project Management Institute (2013) defines two broad families of contractual relationships for compensation; either fixed-price or cost reimbursable, with a hybrid category between these called time & materials contract. Furman (2015) states that there are two broad categories of contract types; the fixed price versus the cost plus. According to Springer (2016), the contract types are grouped under the heading of two broad categories; fixed price contracts and cost reimbursement contracts. Similarly, Lædre (2009) states that the two most used contract strategies for remuneration of the contractors' services are cost reimbursable and fixed-price contracts.

While the literature seems to agree on the two outlying categories of fixed price and cost reimbursable contracts, their definitions on the hybrid categories(s) are more misaligned. Turner (2007) is the only source out of the top publications that discretely defines the remeasurement contracts as a category of its own, and differentiates this category from the time & materials contract category. Griffiths (1989) also discusses remeasurement contracts, but rather as a contract type of its own than a category of contract types, along with bill of quantities and schedule of rates contracts in a category defined as "measured contracts". It would seem that the Project Management Institute (2013)'s definition of time & materials contract category vaguely encapsulates the contract types defined in Turner (2007)'s remeasurement contract category. However, Turner (2007) has a different view on what he has defined as time & materials contracts, and dismisses them as a "fool's game". Griffiths (1989) probably has the most different classification of the contract categories and its types, which most likely is related to the fact that he wrote the article long before the other publications were made. Both Furman (2015) and Springer (2016) are more aligned with the definitions of the Project Management Institute, defining the two broad categories of fixed price and cost reimbursable contracts, and including the time & materials category as a hybrid category.

Suprpto et al. (2016) states that project management scholars distinguish the contract types between two categories; traditional (fixed price and cost reimbursable) and relational contracts. Instead of looking at the time & materials or remeasurement contracts as the third hybrid type, Suprpto et al. (2016) looks towards partnering/alliance contracts. Similarly, Hoff et al. (2016) identifies so called incentive contracts as a third category between the two polar extremities, and Maccormack and Mishra (2015) refers to the third hybrid category of contracts as performance-based contracts.

When presenting the different contract types as in the theoretical framework, different considerations had to be made to avoid overlaps between definitions and terminology from the various literature. It was decided that the remeasurement contracts described by Turner (2007) along with time & materials contracts constituted the third hybrid contract in between the two extreme categories. Some of the contract types included in the fixed price and cost reimbursable contracts can also be argued to be hybrid contracts, since they share some of the characteristics or advantages/disadvantages from both categories.

6.1.2 Contract types used towards consultants in construction projects

The contract designs, as well as most of the other instruments in the contract strategy (see figure 1), are contractual relationships between the project owner and the contractor(s). While the literature does not explicitly mention consultant(s) as a party in the contractual relationships, it is fair to assume that the term “contractor” is used as a common denominator for the agent which includes consultants as well. It will be more convenient to regard these contractual relationships as between a principal, which in most cases will be the project owner (but can also be the contractor as in the case study), and an agent which in most cases is the contractor (but can also be consultants, suppliers, etc.). There are few to none of the publications found throughout the literature review that explicitly describes contractual relationships between a main-contractor, like Veidekke is in Team Veidekke DA, and consultants. There could be several reasons to this, without speculating too much; One being that the design-build contract, which is the most used contract design in the Norwegian Construction industry, may not be that much used internationally. Another being that the definitions are still equally valid, whether it is a contractual agreement between a project owner and a contractor, or between a main-contractor and a consultant.

From the results of the interviews conducted in the specialization project last fall, it seems like there are two traditional ways of compensating consultants that provide engineering work; either through fixed price contracts or by contracts with hourly-rates based on budgeted amount of time (hourly-rates with an upper cost ceiling). The building design managers interviewed in the specialization project last fall both mention that they use the standard contracts provided by Standard Norge, NS8401 and NS8402, as templates when hiring consultants for engineering work. These standards were referred to as templates for fixed price and hourly-rates respectively. The contract with hourly-rates based on budgeted amount of time is similar to the remeasurement contract based on schedule of rates (R-SOR), which

again effectively is a cost reimbursable contract. Hence, it would seem that the consultants are contracted on either extreme contract category, a fixed price or a cost reimbursable, which helped confirm the initial hypothesis of one of the specialization project's research questions.

The hypothesis from the introduction is further confirmed through the interviews conducted in this thesis, where the consultants say that they are either working on fixed price contracts or contracts with hourly-rates with a budgeted price ceiling in the design phase of construction projects. There are mixed opinions on the suitability of the two contract types, but all the consultants agree that the optimal contract for them would be a contract that has a compensation format that is based purely on hourly rates. Some of the consultants mentions that a difficulty connected with the fixed price contracts is the pricing of the contract. It may seem like the consultancy firms are not good enough or do not have enough resources to conduct proper risk assessments and correctly price the premiums for the fixed price contract. Thus, they might have bad experiences with fixed price contracts where they lose money on the delivery and feel that the hourly rates contracts with budgeted price ceilings are safer.

6.1.3 Contract types in Team Veidekke DA

The consultants from Team Veidekke DA that were interviewed are all working on contracts with hourly-rates with an upper cost ceiling that is budgeted. The contracts are based on the standard contracts provided by Standard Norge, more specifically the NS8401 and NS8402, and each consultancy firm has negotiated their own contract with its unique hourly rates. Team Veidekke has budgeted the estimated number of hours needed for each consultant which creates the price ceiling in the contract. The saved costs for unused hours (if the consultant spend less than the budgeted number of hours) are considered gains that are added to the shared pool that is distributed through ownership share in the partnership. Thus, the contract type is basically a cost reimbursable contract with a price ceiling but can effectively be described as a cost plus incentive fee (CPIF) contract (see section 3.7.2.4) where the price ceiling acts as a target price, and the consultant is awarded a share of the saved costs.

One of the key disadvantages with a cost reimbursable contract is the misaligned incentive it creates for the agent. A cost reimbursable contract without any price ceiling, which was identified as the optimal contract by the interviewed consultants, would be unrealistic because the agent will be heavily incentivized to spend as many hours as possible, to be less productive and to allocate the least experienced resources on the delivery (Lædre, 2009, Turner, 2007). Hence, the cost reimbursable contracts are equipped with a budgeted price ceiling by the principal to lower their risk. However, the interviews reveal that the price ceiling introduces some other issues. Firstly, the principal and the agent need to negotiate and estimate the price ceiling, which may be difficult on more uncertain deliveries. Secondly, if the agent reaches the price ceiling the contract suddenly becomes a fixed price contract which has no upside, and thus no financial incentives.

Some of the interviews reveal that reaching this price ceiling too early for the consultant is an evident issue for many projects, and it causes a negative effect on the overall project. This

may also be linked to the liquidity situation of the smaller consultancy firms, many whom are dependent on a continuous incoming cash flow to survive. While keeping within the price ceiling is initially the agent's responsibility and that the price ceiling is something the agent has agreed upon, the project deliveries can be affected by unforeseen events which demands extra hours to complete the work. Unforeseen events often cause additions or adjustments in the delivery which are typically dealt with through notifications of change that are regulated through the contract. In the contracts used towards the consultants in Team Veidekke, changes or additions to the delivery must come from the project owner (changes in the design-build contract between the project owner and Team Veidekke) to be eligible for notification of change that can increase the price ceiling in the contract. All other costs from changes or additions that comes from within Team Veidekke must be covered by each consultancy firm and is considered part of the design specification. The interviews reveal that this aspect of the collaboration is considered particularly challenging for the consultants, and that this uncertainty in the cost coverage of changes and additions may complicate the decision-making in the design phase.

6.2 Alignment of incentives through Team Veidekke DA

The misaligned incentives identified in the contracts used towards the consultants are evident to various degrees in practice. By organizing as a general partnership with a shared liability, the incentives in the underlying contracts may be affected in certain ways, and hopefully be better aligned towards the good of the project.

6.2.1 Shared gains/losses as financial incentives

In addition to a shared liability that scales with the ownership share of each partner in the partnership, the gains or possible losses are also shared. Team Veidekke acts as a main-contractor in a design-build contract with a fixed price for the total project delivery, and profits from the contract is distributed to the partners based on their ownership share. Consequently, if Team Veidekke accrues more costs than the price of the contract, the losses are shared among the partners in the same way. For the consultants working on cost reimbursable contracts with upper price ceilings, saved costs on their contracts will add to the overall pool of shared gains that is to be distributed among the partners. In this way the shared gains/losses should help offset some of the fundamental misaligned incentives that occurs in the contracts by incentivizing cost savings, increased productivity and efficiency, and allocation of best available resources.

The resulting incentives from the shared gains/losses can be regarded as financial incentives, and more specifically cost specific financial incentives as described by Blyth (1969). Since both gains and losses are shared, these cost specific financial incentives arguably includes both inducements and threats as mentioned by Bower et al. (2002), as well as providing the agent with opportunities for higher profit margins as pointed out by Rose and Manley (2011). The shared gains/losses do however not provide schedule or quality specific incentives explicitly as described by Abu-Hijleh and Ibbs (1989), Bower et al. (2002) and Tang W (2008). One can also look at the resulting incentives from the shared gains/losses as semi-

financial incentives as described by Harris et al. (2013), and treat the shared gains as long term goals considering they will depend on the long term success of the partnership.

The interviews reveal that the consultants are aware of the financial incentives related to the shared gains/losses but find them less appealing than what they perhaps were intended to be. This is mainly due to the very low ownership shares of the consultancy firms in the general partnership, where they all have less than a couple of percent ownership share. Consequently, their individual share of any potential gain will be very small, and thus may defeat its purpose as a financial incentive in the overall contract. Perhaps more alarming is the potential paradox mentioned particularly in interview 4, where the consultants can incur losses on contributions that are overall beneficial for the project. The paradox can be summed up using an example; Let us say a consultant comes across an idea for a change or alteration in the design that might reduce the overall costs of the project by 10M NOK, and that the evaluation and implementation of this solution amounts to 1M NOK in self-cost for the consultant. To proceed with this decision would be more than reasonable for the overall project but would at the same time be totally unjustifiable for the consultant since they would only share a couple of percent of the shared gains of 10M and have a corresponding self-cost of 1M. This potential paradox undermines the win-win situation, and some of the consultants finds this as a particular weakness of the collaboration model.

The perhaps most innovative aspect of using shared gains/losses as part of a collaborative partnership is the incentivization of voluntary contributions beyond what is “expected” or specified in the contract. The idea that everyone is in the same boat, and that free work that increases the quality of the delivery or helps save costs on the overall project will be financially rewarding, is interesting in the context of improving the efficiency of construction projects. However, the idea falls short if the shared gains from the contribution is not reflecting the consultant’s own self-cost of the effort. The model then becomes interesting in principle because it underpins common goals and that saved overall costs for Team Veidekke DA provides individual gains for each consultant but may not work as intended because of the flat distribution based on percentage shares might not justify the individual effort of each consultant. Thus, the project might miss out on potential beneficial decisions because the consultants are not incentivized as intended to do the voluntary contributions when they do not have a strategy for covering the self-cost of these contributions. Another issue is the difference between the contractor and consultant in the contribution of effort that saves the overall project costs. The contractor can potentially provide tremendous cost savings for the project through bartering prices with their suppliers but might not be faced with the risks of wasting resources on the same scale as the consultants.

Team Veidekke should discuss and evaluate how the gains from doing innovative changes and additions that saves cost on the overall project are distributed relative to the self-cost of the consultant(s) that contributed to the cost saving. This may of course be brought up by the individual consultants for each case and discussed among Team Veidekke, where they might agree to at least use a share of the saved overall costs to reimburse the consultant’s effort for that specific contribution. The interviews reveal that the process of the shared gains/losses and

the collaboration in general is being explored along the way, and that there is an uncertainty regarding how changes are dealt with within Team Veidekke and the cost coverage of the changes. But as mentioned previously, the perhaps most interesting and innovative idea about this way of collaborating is that the individual consultants and contractors could be subconsciously incentivized to provide voluntary effort that saves costs for the overall project. Imagine an incentive schema which financially encouraged any effort that provides lower overall costs, regardless of the individual self-cost of the effort. One idea that was brought up in one of the interviews was introducing a pool for covering self-cost of contributions and efforts that provides less net costs for the project. The point being that such incentives for voluntary efforts to reduce the overall cost of the whole project should be latent, where if the individual consultants will have to bargain with the partnership every time they have innovative ideas that reduces the costs, the transaction cost of this negotiation will negate the incentive.

6.2.2 Principal-agent problem

Since the project organization of construction project typically consists of three different “camps” or “teams” – the project owner, the contractor and the consultants – the principal-agent problem is something that is present in the organization. The perhaps most challenging part of the principal-agent problem for the project organization is the moral hazard described by Quinn (2011), where the principal and the agent often have competing self-interests. Traditional construction projects typically involve a multitude of two-party contracts that create a vertical chain up to the project owner, where the commercial terms for each participant provides economic incentives for them to maximize their own self-interest regardless of the interest of the overall project (Thomsen, 2009). By integrating two of these three typical parties through a general partnership these self-interests, at least for the contractor and consultants, may perhaps be better aligned.

An incentive schema could be used to counter some of the principal-agent problems between the principal and the agent (Moe, 1984, Quinn, 2011). The shared gains/losses in the partnership is intended to provide such an incentive schema for the consultants as agents towards Team Veidekke as the principal, where the financial self-interest of the consultants coincides with the financial self-interest of Team Veidekke (if Team Veidekke is profitable, then the partners individually will be profitable). However, as discussed in the previous section, the low ownership share of the consultancy firms and the flat distribution of gains may not be enough to completely align the self-interest.

Additionally, by organizing as a general partnership with a shared liability to integrate the contractor and the consultants you can possibly eliminate some of the principle-agent relationships between the contractor and the consultants. If the partnership manages to completely align the self-interests of the participants, Team Veidekke and their participants can be seen as one agent in a principal-agent relationship with the project owner. However, this will increase the non-contractual relationships between the contractor and consultants since they can be regarded as one entity, thus requiring trust between the participants to

minimize the information asymmetries within the partnership as shown by Ceric (2014b). If Team Veidekke manages to create a trustworthy environment with cooperative relationships between the participants, they can potentially eliminate some of the principal-agent problems between themselves.

6.2.3 Semi- and non-financial incentivization

While the financial incentivization is attempted aligned through a shared gains/losses incentive schema, the interviews revealed that there are other, perhaps more important incentives present in Team Veidekke DA. The consultants identify long-term incentives like industry relations, network effects and future contracts occurring from the collaboration. These types of incentives fits the description of semi-financial incentives by Harris et al. (2013), and provides motivation for doing something to achieve some future financial gains or indirect financial gains from doing it. This is important to add to the discussion of the pure financial incentives of the shared gains/losses which may be more symbolic than effective for the consultancy firms, while the semi-financial incentives from the collaboration is what could provide the real gains for the consultancy firms. During the interviews, the consultants explained how it was important to make this project a success because of how important both Veidekke is as a contractor and OBOS is as a project owner for future contracts.

The consultants also mention several different incentives that occur because of the collaboration, such as increased recognition for their work, more fairness in the contractual relationship, friendlier work environment, sense of ownership, etc. These incentives fits the description of non-financial incentives by Harris et al. (2013), and can be considered intangible and be related to higher motivational needs like self-fulfilment and self-expression. While the semi-financial incentives discussed above are pointed out as very important aspects of the project by the consultants, they all identified the non-financial incentives as perhaps the *most* important incentives. These types of incentives can often be underrated in the big picture which is often dominated by economic and contractual aspects, but concurs with research in economic and psychology which shows that non-financial factors play a key role for performance and motivation of the agents (Darrington and Howell, 2011).

6.3 Team Veidekke DA as integrated project delivery method

While The American Institute of Architects has a clear definition and vision of what constitutes an Integrated Project Delivery (IPD) contract through specific principles, Thomsen (2009) discusses different approaches through various legal structures which provides different degrees of compliance with said principles. While full integration and a “true” IPD-contract is what provides the best fundament for a collaborative and effective project organization, you also need to take into account the context of the project and the strategy of the project owner.

6.3.1 General partnership with a shared liability

According to Thomsen (2009), the design of the legal structure used as part of the integrated project delivery system is about juggling primary considerations of responsibility, risk and collaboration with secondary considerations of taxation, administrative cost and public liability. Team Veidekke chose to use a general partnership with a shared liability to integrate themselves and the consultants into one entity that acts as the main-contractor that is set to do the design-build contract for the Ulven B2 project.

This legal structure with a general partnership can be seen as a joint venture as described in section 3.11.3.3. Team Veidekke could perhaps have used a private limited company (AS) and had a legal structure similar to the limited liability company described in section 3.11.3.4, which would limit their liability to the project owner, but this would certainly not be in interest of the project owner. A general partnership is thus the most convenient legal structure for a fair distribution of responsibilities and risks for the project owner and the partnership. Since the partnership consists of several independent companies, some whom are much smaller than others and can only manage a small ownership share, a joint and several liability (ANS) would not be viable since all the partners have unlimited and personal liability for the entire debt. This would spell serious trouble for the smaller partners if Veidekke, which has the majority share, defaults for instance. Thus, a general partnership with a shared liability (DA) provides the best suited considerations for a joint venture like this, where the partners can only be liable equivalent to their share of the liability (their ownership share). It is also worth noting that some IPD-advocates favours the joint and several liability over the shared liability since it in theory forces each individual partner to better commit to the overall project by being individually liable for the whole delivery (Thomsen, 2009). However, this would be practically impossible in an arrangement with some partners having less than a percent ownership share like in Team Veidekke.

6.3.2 Semi-integration through an “IPD-ish” contract

Since the collaborative contract is through a joint venture using a general partnership between the contractor and the consultants, and not the project owner, the project delivery method cannot be classified as a true IPD-contract. According to AIA (2014), the collaborative project delivery method can only be called an IPD-contract if it meets all of the components of the IPD principles in section 3.11. Thus, the Ulven B2 project can at best be classified as a so called “IPD-ish” contract, where it uses some of the IPD principles to increase integration and align the interest of the different participants. Harper (2014) suggests that the level of integration of project teams relates to project success, and that the traditional project delivery methods using contract designs as design-build, management or design-bid-build contracts generally do not promote integration. This might be better achieved through integrated project delivery, even if the contract does not use all of the IPD principles. The shared gains/losses, the joint venture, the early transdisciplinary integration and the collaborative focus between the contractor and consultants are certainly in the spirit of integrated project delivery.

Team Veidekke claims to promote a more cooperative project organization, by providing win-win situations for both the contractor and the consultants. Turner (2007) argues that a cooperative project organization should be the correct way of executing projects, and that project organizations should try to avoid becoming a competitive marketplace where one party win and one party lose. The key issue with win-lose relationships in a project organization is that it often leads to lose-lose outcomes, that is, both parties ends up losing. Team Veidekke tries to promote this win-win situations by integrating the participants to one entity, and with the shared gains/losses as the specific incentivization. The cooperative versus competitive aspect of the project organization is also reflected in the interviews, where some of the consultants are concerned that in traditional project delivery methods the contractor might treat the procurement of consultancy hours the same as the procurement of nails and boards. The consultants say that it is different with Team Veidekke, where the contractor has a better understanding and recognition of the consultants and their contribution.

Another concern with using an “IPD-ish”-contract is the degree of integration and how true the project organization is towards the IPD principles. One of the consultants mentioned during his interview that so-called “collaboration contracts” were thrown around quite a lot in the industry lately, and that most of them were actually just regular design-build contracts with a few minor details of collaboration and integration. It is important that projects do not exploit the integrated project delivery method to win contracts and provide advantages in tenders and competitions if they are just masking a design-build contract. The only option to create a “true” IPD-contract which is consistent with AIA (2014)’s definition would be to use a legal structure with a single multi-party contract as described in section 3.11.3.2, where also the project owner is part of the contractual collaborative agreement. The interviews reveal that integrating the project owner in the collaborative contract could have several advantages for the project, most prominently the communication and interaction towards the public institutions and regulators. The Ulven B2 project was advertised through an innovation contest that had the purpose of choosing a main-contractor for a design-build contract. Integrating the project owner in a general partnership with a shared liability was considered not ideal and having full integration and a true IPD-contract was thus not option. However, it should be in the interest of all the participants to explore this approach for large and complex construction projects like the Ulven-development. If the integration of two of the three main project parties is positive, it would make sense that a fully integrated project team including the project owner would be increasingly positive.

6.3.3 Lower conflict level and reduced transaction costs

As was revealed in the specialization project last fall, one of the more prominent problems in construction projects is that costs tend to accrue during the construction phase. Changes in the design, disagreements in the project organization and poor communication can lead to costly redesigns or temporary halts in the construction. Some of these problems are due to coincidences surely, but many can be due to poor communication between different disciplines in the design phase and the contractor that executes the construction phase of the project. The interviews reveal that this may be one of the key advantages of this particular

project delivery method, that the different consultants from different disciplines as well as the contractor has an early integration that ensures that they are all on the same page regarding the design, the quality and where rational solutions can provide cost savings. The construction phase is quoted as much more capital intensive, or “costly” than the design phase. However, a lot of the additional costs that tend to accrue during the construction phase can be mitigated by reducing the risk of surprises through a better and more thorough design phase where all the participants are involved.

Additionally, unforeseen events combined with incomplete contracts, especially during the design phase and with specialized work, contributes to substantial transaction costs for the project organization. The more interesting of these transaction costs seem to be related to change orders, claims, legal disputes and general conflicts (Li et al., 2012). Some of the interviews revealed that conflicts are an unfortunate reality of the design-build space of the construction industry, and that the consultancy firms have little to no power if it comes down to legal disputes with the main-contractor. The interviews also reveal that there have been little to no conflicts within Team Veidekke so far, and that the few conflicts that have occurred have been between Team Veidekke and the project owner. Through integration of the contractor and consultants as one entity, the conflict level may be reduced, and the project organization can avoid some of the transaction costs related to enforcing the contractual relationship between consultant and contractor/project owner. Team Veidekke claims themselves that the reduction of traditional contractual relationships between the contractor and the consultants is one of the key advantages with the partnership. These contractual relationships often come with mark-ups and premiums from the agent to manage the risks, something that should be avoided through this integration. This should lead to less overall transaction costs in the project.

Perhaps the best argument for integrated project delivery in general is the reduction of legal disputes. Very few construction projects that uses IPD-contracts, in varying capacity, ends in litigation (AIA, 2007, Thomsen, 2009). This is perhaps the greatest strength of more integrated project organizations, and you can apply the same logic towards Team Veidekke DA, where it would make sense to solve any conflicts among themselves without taking legal action since they are all in the “same boat”. Litigation over claims or mistakes in the design phase or over disagreements in the contract, which are expensive for both parties, would probably be something of a last resort since they are all part of the same partnership.

6.4 Financial versus non-financial incentives

Since the non-financial incentives are generally difficult to express contractually because of their nature as intangible, most incentive schemas incorporated in contract types are of the financial or semi-financial type. Usually, most of the focus is on the strictly financial incentives since these are easy to express and provide clear goals and motivation towards improving specific aspects of the construction project; time, schedule and quality. However, the consultants that were interviewed seemed more interested in the non-financial incentives that the collaborative environment created for them, and it may seem like for the Ulven B2

project the general incentives are more important than the specific incentives described by Barnard and Andrews (1971).

6.4.1 Importance of non-financial incentives

The consultants highlighted incentives like fairness, responsibility and recognition as particularly important, some stating that they were for instance proud of being part of company which has a lot of expertise and skilful people. Furthermore, the integration adds more understanding across disciplines and between the contractor and consultant. The interviews indicated that contractor-consultant relation can often be strained in the traditional project delivery methods, since they usually have different perspectives of the project delivery. While the consultant may often be genuinely interested in delivering high quality and likely more expensive solutions, the contractor may look more towards effectiveness and finding the cheaper solutions. The interviews reveal that this aspect has been working out particularly well in Team Veidekke, and that better integration of the contractor and consultants have increased each participants' understanding of each other. The consultants say it is relieving that the contractor understands the complexity of technical systems, that their advices are heard and respected and so forth. Likewise, the consultants better understand the contractors point of view, and that the project will need rational and innovative solutions to be able to reduce the construction costs by 20%.

6.4.2 Relational aspects of contracts

While the literature points out the potential importance of the human factors and relational aspects of the project organization (Cheung et al., 2005, Harper, 2014), the interviews also reveal that these are important and maybe underrated as well. The consultants praise the approach of Team Veidekke when it comes to the building of interpersonal relations through workshops, gatherings and other social activities. These are things that are often overlooked in traditional construction projects. Small things like physical allocation of participants of the project team for instance, can greatly enhance the communication and collaboration. As Ceric (2014b) points out, trust seems to be the preferred strategy to minimize information asymmetries in construction projects, and trust is not something that you necessary get through a contractual agreement but rather something that is built by interacting with each other on a daily basis. Construction contracts are relational exchanges and the projects tend to fail when the human factors are not considered through the contracts (Harper, 2014). The interviews also reveal that the ability to get to know the people of the project team on a personal level creates a commitment for everyone to deliver better quality, reduce costs and deliver on time. However, the interviews also reveal that one vulnerability of the collaboration model of Team Veidekke is the dependency on the individual persons of the project organization. As one of the consultants said; "the project organization is no better than the people involved".

7 Conclusion

This chapter provides a conclusion of the thesis where the research questions stated in the introduction are attempted answered. This chapter will also highlight the limitations of the study, as well as pointing out suggestions for further research.

7.1 Alignment of incentives

Team Veidekke DA is using a shared gains/losses incentive schema to provide the financial alignment of the self-interest of the various consultants and the contractor towards the self-interest of the partnership. It is important to notice that the self-interest of Team Veidekke, which acts as the main-contractor in a design-build contract with the project owner, might not be the same as the self-interest of the project owner. Hence, one might argue that the shared gains/losses incentive schema in the partnership does not properly align the self-interest of the consultants towards the *overall project*, and that Team Veidekke might still have conflicting interests with the project owner. Another important issue with the shared gains/losses in Team Veidekke is the incentive intensity. The consultants do not feel like the shared gains/losses provides a real financial incentive for them because of their low ownership shares, and that the incentive is more symbolic than realistic. Shared gains/losses are certainly an incentive schema that can be introduced as part of the compensation to better align the incentives of the contract types. However, the shared gains/losses model used in Team Veidekke DA do not provide the desired financial alignment because of the flat distribution model that is based on the ownership shares. This is because the ownership shares of the consultancy firms simply are too low to make a significant financial impact. The consultants agree that the model is interesting in its principle, and further discussion and research should be devoted towards creating a more optimal distribution of the shared gains/losses or perhaps a better coverage of the self-cost each consultant has related to the contribution of voluntary effort towards overall cost savings.

The shared gains/losses can be seen as a two-folded financial incentive. Firstly, the idea that whatever costs that each consultant saves on doing their work in the contract (i.e. using less hours than budgeted and used as price ceiling) is added to the pool of shared gains. This is supposed to incentivize the consultants to not exhaust their budget if not needed, and thus eliminate the underlying incentive of cost reimbursable contracts. However, this requires a great deal of trust and loyalty between the partners of the general partnership in that everyone does their part for this to work properly. The second financial incentive the shared gains/losses is supposed to provide is the motivation for doing voluntary efforts and decisions that reduces the overall costs of the entire project. These contributions may even cause the individual consultant to exceed their budget but should be beneficial decisions since an overall cost reduction will spill over as a gain for the consultant through their ownership share. Because of the low ownership share of each consultant and the uncertainty regarding the cost coverage of voluntary effort, the shared gains/losses seem to fail as an incentive for both of these cases in practice. Thus, the shared gains/losses might not financially align the misaligned incentives created in the cost reimbursable contracts of the consultant after all.

The more evident alignment of the incentives that is resulting from the collaboration model is not of the financial type, but rather the semi- and non-financial incentives. All of the consultants identify long-term semi-financial incentives with the partnership, like industry relations, network effects and future contracts. Some of the consultancy firms relies on continuously getting contracts for future work in order to have a predictable economy, which can explain their emphasis on this aspect. However, what is probably the most interesting alignment of the consultants' self-interest is from the non-financial incentives that the collaboration provides. This includes fairness in the contractual relationships, recognition as an equal partner in the project organization, respect and understanding of the technical complexity involved with the consultants' deliveries, etc. Hence, the alignment of incentives through the general partnership comes mainly from the semi- and non-financial incentives, and not the financial ones.

7.2 Importance of the different incentive types

The semi-financial and non-financial incentives are perceived as more important than the pure financial incentives by the consultants in the case study of the Ulven B2 project. On one hand this is due to the shared gains/losses partially failing in providing the incentivization it was intended to provide, because of the distribution of the gains and the coverage of self-cost as discussed previously. On the other hand, the collaboration promotes the semi- and non-financial incentives more strongly than compared to traditional project delivery methods. The options for further contracts with the Ulven development for Team Veidekke, the network effects and industry relations within the project organization provides strong semi-financial incentives that each consultant identifies as particularly important during the interviews. Something that may be considered as side-effects or spill overs from the integration of the project organization is the non-financial incentives, which are acknowledged by the consultant and have a significant effect on the motivation and inspiration of their daily work. Since these non-financial incentives are often intangible and are difficult to state contractually, they may often be overlooked when designing incentive schemas for the contract types. For instance, the non-financial incentives are not a result of the specific contract type used towards the consultant, but rather a product of the overall project delivery method than includes more integration and closer collaboration.

Team Veidekke has also put in a lot of effort towards recognizing the relation aspects, or the "human factor" of the collaboration, which are perceived as very important by the consultants. While many studies on contractual incentivization in construction projects focus on the details of the contract type; the mechanics of the remuneration or risk absorption, it could be worth looking more towards what higher motivational needs the contract, or perhaps better, the project delivery method provides. Another great example of the impact of the different type of incentives is the ownership through the general partnership. The interviews reveal that the individual consultants find the *sense* of ownership as more important than the actual ownership share their firm has. This may of course be different if you interview the upper management of the consultancy firms, but the point being that the ownership share in

the general partnership, which is very low for all of the consultancy firms, provides its strongest incentives not through the specific number of percentage in the contract but rather through the sense of ownership, recognition and intrinsic motivation. The consultants feel, some for the first time, that they are essential for the success of the overall project. This essentiality is regardless of the size of the ownership share.

7.3 The ideal contract type

The specialization project of last fall concluded that Norwegian construction projects using a design-build contract design usually contract the consultants that provide engineering work by either a fixed price or an hourly-rates with a budgeted price ceiling. These two contract types represent more or less variations of the extreme contract categories of fixed price and cost reimbursable contracts as described in the theoretical framework and are based on the NS8401 and NS8402 standard contracts provided by Standard Norge. The case study partially confirms this claim, where the consultants mentions either the fixed price or the hourly-rates as the contract type they had been used to work on. The exceptions being one consultant that mentions a contract type involving a target price and some consultants that mention they have previously been working on pure hourly rates. The pure hourly rates, or cost reimbursable contracts, seems to be used when the consultants are hired directly by the project owner and the delivery is highly uncertain. While the literature describes a multitude of contract types with different designs and incentive schemas, there seem to be only two types that are actually used towards the consultants in a typical construction project. This leads me to the conclusion that the contract types might be underrated as an instrument for both distribution of risk and responsibilities, but also as an instrument of incentivization and motivation. Furthermore, the consultants interviewed seems to be less aware of the impact and implications of their contract type on how they do their work than the theory would suggest. While for the purpose of this study it was interesting to talk to the consultants, the persons that are actually carrying out the engineering work for the design phase of construction projects, for their experience of how the contract types affect their work, the considerations regarding the choice of contract type might better be answered by talking to the upper management of the consultancy firms, contractor or the project owner.

Most of the consultants seem to favour the cost reimbursable contract over the fixed price contract and adds that their ideal contract type would be a pure cost reimbursable without any price ceiling or budget to deal with. The theoretical explanation is that the contract type has one of its key features in being an instrument of risk distribution, where the consultants transfer as much risk as possible over to their principal in the case of having a pure cost reimbursable contract. This is an important point to notice. Some of the consultants mentions their liquidity situation as very different (and less liquid) than the contractors, and often find the fixed price contract as less rewarding. They say that their biggest issues are related to their pricing of the fixed price contract, and that they might not have enough expertise of the risk versus reward management and tend to price their premiums too low to provide a substantial profit worth the risk. The consultants also identify the issue of being “pushed on price” by their principal as particularly challenging, which might also explain their aversity of fixed

price contracts. It might be that the consultants have generally little capacity for bearing the risks related to especially the fixed price contract. The cost reimbursable contract provides more predictability for the consultants, even with a cost ceiling based on budget since this usually is up for negotiation during the contract and can be affected through notifications of change.

Regarding the “contract for the future”, an incentive-based engineering contract, I believe it should be of interest to explore the idea of a cost reimbursable contract without any price ceiling since this seems to be the preferred ideal contract type for the consultants. However, there are some strongly fundamental misaligned incentives for the agent in the cost reimbursable contract; the incentive to spend as much time as possible, the incentive to be less productive, the incentive to allocate the least experienced personnel, etc. Even though most of the consultants are professional and would probably not exploit a contract like this, the risk for the principal is simply too big for it to be practically viable. However, the case study shows some tendencies and ideas for how these misaligned incentives can be better aligned through other instruments like the overall project delivery method. Shared gains/losses for example, with the right distribution and incentive intensity, could offset some of these misaligned incentives. Additionally, the consultants highlight trust and loyalty as important factors for the success of Team Veidekke. One of the consultants also argue that there should be room for having pure cost reimbursable contracts without any price ceiling since the collaboration is characterized by trust and loyalty. If integrated project delivery, be it through and “IPD-ish”-contract like the case study with Team Veidekke or any other forms of IPD-contracts, can properly anchor trust, loyalty, commitment and responsibility, as well as eliminating the risk for the principal, a cost reimbursable contract without any price ceilings might be realistic as a contract for the future for consultants providing engineering work in construction projects.

7.4 General partnership as a mean for integrated project delivery

Team Veidekke DA as a general partnership with a shared liability manages to integrate two out of the three major parties in the construction project; the contractor and the consultants. While the collaboration cannot be regarded as a true IPD-contract as described in the literature, particularly by The American Institute for Architects, the project delivery method can at least be characterized as an “IPD-ish”-contract. The partnership manages to introduce some of the key principles of integrated project delivery but lacks the integration of the project owner to realize the full potential of the concept. The interviews reveal that the integration of the project owner can have both advantages as well as disadvantages, and that it may not be suited for the particular project that is presented in the case study. However, this is something that should be explored by the Norwegian construction industry, since the integrated project deliver suggests solving the trilemma of optimizing cost, time and quality in construction projects. Furthermore, the literature suggests that increased integration relates to project success, which means that integration of the project owner should be desired.

The key advantage from the collaboration model used by Team Veidekke is arguably the early integration of the contractor and the various consultancy disciplines in the design phase. In the Ulven B2 project the contractor and consultants have been on the same page regarding cost and quality from the start, which have led to innovative and rational solutions that lets them achieve a 20% reduction in construction cost while maintaining an adequate quality for the delivery. The early integration has enabled Team Veidekke to lock in the design earlier and avoid many of the potential redesigns since the different consultants can fit their specifications better with each other through a closer collaboration earlier in the design phase. Consequently, the project can potentially save substantial costs on traditional problems like changes in the specific design or changes that have to be made during the construction phase. Furthermore, the interviews reveal that the Ulven B2 project has surpassed the Ulven B3 project which is delivered through a traditional project delivery method and acts as a reference project. Thus, it might seem that Team Veidekke has managed to achieve at least a good compromise for both cost, quality and time, certainly a step in the right direction to solving the trilemma discussed earlier.

The consultants that were interviewed say that this way of integrated project delivery is an entirely new experience for many of them, and it may seem that some consultants need time to adjust to the culture and mindset of this type of collaboration. The consultancy firms were also quite sceptical to the idea of having an ownership share in a general partnership to deliver a project, and especially the idea of taking on the risk involved with the liability and a potential shared loss. The consultancy firms' business model is traditional in the sense that they rely on invoicing hours and is fundamentally different from having their business interests aligned through shared risk/reward, including financial gain at risk that is dependent upon project outcomes. The concept of integrated project delivery has been around since the early 2000's but has yet to become any standard for construction projects, at least in the Norwegian construction industry. It will most likely take time to adjust to this mindset and to change a traditional culture that has been somewhat characterized by competition rather than cooperation.

7.5 Limitations

While the theory, discussion and conclusions of this thesis may be applied to various types of projects in different industries, this thesis is limited to construction projects in particular. This thesis aimed at putting some of the theory of the contract strategy in construction projects, more specifically the theory on contract types, project delivery methods and incentives created in the contractual relationships, in context by analysing the literature up against a case study which uses one approach towards integrated project delivery. The purpose was to see whether such an approach can help align some of the misaligned incentives created in the typical contract types used towards consultants providing engineering work in the design phase of the construction project. Since the thesis explores many different topics and try to weave these together to create an overview of the contract strategy in construction projects, the theoretical framework of this thesis is limited to the fundamental aspects for many of the topics. The case study was examined and analysed up against the literature to provide a more

practical perspective to the thesis, and because of time constraints of the thesis I was unable to follow the case project to completion. At the time of writing this thesis the case project was in its design phase, with the construction phase estimated to start sometime in the summer of 2018. Thus, the case project lacks information and data that would otherwise help to evaluate whether or not it was successful or not.

The research has most of its limitations due to the fact that there is only one case study involved, and that this case study explores only one particular construction project using one particular approach to the project delivery. There are certainly many different circumstantial aspects that influence this particular case project, which affects the generalizability of the research. Furthermore, only five consultants were interviewed, which is merely enough to make any definitive claims and conclusions. Also, the case study only provides the perspective of Team Veidekke DA and not the project owner, which is a drawback and lessens the objectivity. The project owner might have other experiences and ideas of the Ulven B2 project, which would help balance the research. However, the research should be able to provide some insight and identify some of the underlying issues to the problem statements related to how consultants are incentivized by their contract types.

7.6 Implications of the research

The possible implications of this thesis are:

- Increased understanding of the misaligned incentives in the contract types used towards consultants providing engineering work in the design phase of construction projects, and how these incentives can be better aligned.
- Increased understanding of the impact of more integrated project delivery methods on the various project participants, the project organization and the phases of the project.
- Contribution towards the knowledge base for creating a contract for the future, a contract which underpins win-win situations and can possibly help increase the efficiency of construction projects in general.
- Better insight in the mechanisms of incentivization, motivation and inspiration in contractual relationships of construction projects.

7.7 Further research

Hopefully this thesis can lead to further research on the topics of incentive-based consultancy contracts, integrated project delivery and collaborative project organizations. There certainly seems to be an initiative from the both the industry and the research community to explore these concepts further. While there are many technological innovations that are being introduced to the construction industry and provides means for increased efficiency, the organizational and contractual aspects will also need continuous innovation.

This research has allowed me to get some insight and knowledge about the topics and sparked some ideas for further research. A logical step forward for Ulven B2 project would be to have

a quantitative analysis of the results of the project after completion, to see if the costs were indeed reduced and if the overall project became a success. Further qualitative research could include a comparative case study, which compares the various approaches to integrated project delivery against each other to identify advantages and disadvantages. It would be especially interesting to compare “true” IPD-contracts which includes the project owner against the various “IPD-ish”-contracts that has different types of semi-integration. Regarding the financial incentives of the contract types, further research which includes input from the upper management of the consultancy firms as well as the project owner could be an idea to understand better why the different contract types are chosen relative to the income models and overall strategies.

Since the concept of integrated project delivery is quite new, it would be logical to do more quantitative research as more and more data becomes available the more projects are being completed. Statistical analyses of larger datasets which looks at costs, schedule and other quantitative metrics would be of interest, to compare this project delivery method as well as other integrated project delivery methods with the traditional ones. Also, something that came to mind when writing this thesis and talking with the various consultants, was the issue of trust in general and the different risks that the participants have to shield themselves from. It could therefore be interesting to apply some game theory for example in situations where there are risks for bad behaviour and exploitation of the contracts. In the case of Team Veidekke this could be the question of doing what is best for yourself or what is best for the project team. For example, what is keeping the individual consultants to treat their contract as a fixed price contract (they are paid by the hour up to the price ceiling, but aims at exhausting their budget), gamble that other participants give their best effort to save as much costs as possible to contribute to the pool of share gains, and thereby maximize their own profit? There are certainly many angles one can have when conducting further research on these topics.

7.8 Conflict of interest

The author has no conflict of interest. While some of the data were obtained through interviews with participants that have an interest, both financially and emotionally, in the case project, the discussion, claims and conclusions are my own.

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Appendices

Appendix A: Interview Guide

Appendix B: Transcript Interview 1

Appendix C: Transcript Interview 2

Appendix D: Transcript Interview 3

Appendix E: Transcript Interview 4

Appendix F: Transcript Interview 5

Appendix A: Interview Guide

Introduction to the interviewer

Fredrik Sørum Thronæs, 23 years old from Trondheim.

Student at the Norwegian University of Science and Technology (NTNU). Studying at the Department of Mechanical and Industrial Engineering and taking a master's degree in mechanical engineering with specialization in project and quality management.

Currently writing the master thesis in the final semester.

Research questions

1. How can an integrated project delivery system using a general partnership with a shared liability help align the incentives in the contracts used towards consultants providing engineering work in the design phase of construction projects?
2. Which type of incentives are most important for consultants providing engineering work in the design phase of construction projects?
3. What contract types (compensation formats) would be best suited towards these consultants using this particular project delivery system?
4. Is a general partnership with a shared liability a suitable business structure for a more integrated project delivery?

Background of the study

Both practitioners' experience with engineering work in projects, conducted research projects and empirical studies using the 10-10 method developed by the Construction Industry Institute (CII) implies that the engineering/design work and its deliveries often constitutes a problem in construction projects. The thesis is based on the hypothesis that a core problem related to the engineering work is due to the form of contract and form of compensation, more specifically the contract type, used towards the consultants providing the engineering work and the resulting incentives these provide.

Literature suggest that the industry could benefit from using a more integrated approach to the project delivery system, where the key participants of the project collaborate closer.

The master thesis is investigating how the use of an Integrated Project Delivery (IPD) system, in particular the delivery system used in the OBOS Ulven B2 project with Team Veidekke DA, can possibly be a solution to better align incentives in the design phase of construction projects.

Purpose of the interview

To get a better understanding on how contract types and project delivery systems affect the design phase of construction projects, and how incentives towards consultants could be better aligned with the overall project. I cannot rely entirely on information from the literature, and thus need to engage in conversations with people that are working on real projects in the construction industry. I need practical information and knowledge, as well as listen to experienced project managers and consultants to have a more complete perspective in my master thesis. Hopefully the interviews can reveal important information to be used in the research towards more successful projects.

Practical information

To ensure precision and verification, the interview will be recorded and transcribed, as long as this is approved by the participant(s). A complete transcript will be sent to the participant(s) for verification before the results are published. The name of the participant(s) will be kept anonymous, i.e. "Consultant A".

The interview will be semi-structural and use the research questions primarily as a guidance. The interviewer will let the participants do most of talking and use the research questions along with follow-up questions only to guide the participant(s) if the conversation falls out of topic. Ideally, the participant(s) will do >90% of the talking to get an unbiased interview.

Appendix B: Transcript Interview 1

Participants:

- Interviewer Fredrik Sørum Thronæs (FT)
- Consultant 1 (C1)

Transcript – translated from Norwegian:

FT: *“Introduction to the background of the thesis”*

1. FT: How large is your company’s share in Team Veidekke DA?

C1: Our share is not that big. I cannot remember the exact share, but it is down to a few percent. Veidekke has, of course, the largest share of the company along with the other technical contractors. The ownership share represents the amount of value added to the company, so naturally the consultancy firms cannot match the contractors that are delivering materials like concrete, steel and so forth. But the ownership shares of the consultancy firms are still inflated compared to the value added, even though the shares are low by percent. So that means there is a potential upside for us, economically, if the company does well.

2. FT: How many consultants do you have on this particular project? Or how many do you plan to dedicate to this project?

C1: We won the design/innovation contest based on this one area of the Ulven development, which amounts to around 340 apartments. The idea, or the intention, was that by winning this innovation contest and proving the concept on the Ulven B2 area, Team Veidekke DA would be the preferred contractor for the rest of the Ulven development. The whole Ulven Development contains 3000 apartments.

3. FT: So, this potential long-term relationship on the Ulven Development was something that was accounted for when you decided to join Team Veidekke DA?

C1: Absolutely, yes. It is part of the “carrot” in this way of organizing to deliver a project, where we look further than just the Ulven B2 area.

FT: So, a more long-term and relational approach?

C1: Yes, absolutely. This is a new and innovative way of thinking both for us and for OBOS, where the idea is to repeat a successful project and streamline the whole Ulven development.

4. FT: What contract type is being used towards the consultants providing engineering work like yourself, within Team Veidekke DA?

C1: We have a solution where the company cover the self-cost of the consultants, which is budgeted beforehand. The design-build contract with OBOS that was won through the innovation contest specify the amount that is paid to Team Veidekke DA to cover its overall self-cost. If the self-cost of the consultancy work from our side is less than budgeted, the cost saved is filed as a gain to the overall company that is divided by share. So, the upside is the potential gain of the company that is shared with all, compared to the traditional way where we are reimbursed per hour or the eventual gain from completing a fixed price contract using less resources.

5. FT: Does this project delivery system and collaboration form provide any additional incentives compared to the traditional project delivery systems, in terms of improving quality, reducing time or reducing cost?

C1: Absolutely yes. In a traditional design-build contract, the consultants are pushed hard on price due to the competition to even get in the position to collaborate with the contractor. Then you are left starting the design phase with the only incentive of doing “as little as possible”, that is, spending as few hours as possible to save cost for ourselves to make the most profits. This leaves us very little room for doing more than specified and gives us no incentive to be creative and find solutions with better quality for the good of the project. With the traditional project delivery models, it very often ends up with the different actors trying to salvage their own economy.

C1: In the Ulven Project everyone is “in the same boat”, and each actor is dependent on the overall success of the project. It will not help if we are successful as long as the other are not, since the gains or losses are shared. If we are to be successful, Team Veidekke DA has to be successful!

FT: And this is something you think about all the time during the progress of the project?

C1: Yes. I think this way of organizing is incredibly inspirational in the daily progress of the project. It also gives us incentives to propose better, smarter and more rational solutions across disciplines during the design phase. I think this is a good solution that gives incentives for everyone to pull in the same direction.

6. FT: How did you assess the risk in relation to any eventual shared losses for Team Veidekke DA, in case the project turned out not to be successful? Was the risk for taking on a shared loss something you had to especially consider?

C1: Yes, it was. Mainly because this way of delivering a project was very unusual. Especially for us consulting firms, it was a little bit scary you could say, since we are

used to traditional contracts which does not involve taking on risks like we are in this particular arrangement. We had a dialogue with Veidekke before joining about what the risks involved could be for us. The amount of risk is, of course, dependent on our share of Team Veidekke DA, which will also limit our profit opportunities. Everything taken into consideration, we found out that this project delivery concept was very exciting and could be model for the future regarding collaboration contracts. All in all, we decided that the risk was something we could live with. Worst case we will not earn anything on this project, and the risk of losing a substantial amount of money is very slim.

7. FT: Regarding the collaborative environment between the participants within Team Veidekke DA, how would you characterize the trust you must have towards each other when you are depending on each other to pull in the same direction and provide shared gains?

C1: The way we see it, it is to our advantage that we work in way such that Team Veidekke DA with Veidekke as the major participant, does well economically. The key with this project is that Veidekke's economy is good first and foremost, since they have the majority share. If they do poorly, there will not be any gains left for us.

C1: In my opinion, the biggest difference with this way of delivering a project is the way we and the other consulting firms are recognized by Veidekke as an equal partner. The typical scenario is that the consulting firm becomes dominated by the main contractor in the traditional project delivery systems where we are considered as a sub-contractor. As a sub-contractor in a traditional contract, we may feel like we are being "bullied" in a way by the main contractor and are met by little understanding for our discipline and our special needs and challenges. It is typical that the main contractor underestimates the technical areas, since they are very good at moulding concrete, building, digging, etc. I have to admit that the technical competence of the main contractors is not always that big, and they are in most cases not very interested in trying to understand it as well.

C1: In this project however, I believe Veidekke has been very good to play down their size and lift up the other, smaller participants. Even though Veidekke is much bigger than the rest of collaborating participants. While we have a relatively small share of Team Veidekke DA, I feel that we still have an equal position in the team. This is very inspirational and gives us incentives and motivation to be creative and find the best solutions, both technically and economically.

8. FT: How much of the work in the design phase is being done in collaboration compared to traditional projects? Do you work more closely with this type of project delivery system?

C1: There are closer collaboration in all types of projects these days, and I would not say that there are any big differences for this one. We did however work very closely during the innovation contest before we were awarded the contract. Veidekke has established a project office at their facilities, where people from Team Veidekke DA can come and work together typically 1-2 days of the week.

9. FT: How does this type of collaboration affect the way you prioritize the Ulven-project compared to other projects?

C1: The Ulven-project is the only project where we have an ownership share through a collaborative contract. How important a project is for us depends of course on how economically important it is, but also how important it is for building relations with other actors in the industry and future opportunities for work. The strategical aspect is also important, where the Ulven-project is considered innovating and new, and could give us a lot of good PR for future references. A project can, in other words, have value in many different ways. Of course, if you have many projects running at the same time and experience a shortage in resources, you would want to prioritize.

FT: And if you find yourself with a shortage of resources, would the Ulven-project be prioritized or not?

C1: It will definitely be prioritized. Since it is the first project with Team Veidekke DA, and there are options for further housing projects with OBOS if this becomes a success, it is considered very important. I would say it has a very high priority for us.

10. FT: Have you experienced any conflicts during the design phase within Team Veidekke DA? And how do you solve conflicts, or even worse, legal disputes within the company?

C1: Since this is still in early stages and it is the first time anyone has tried delivering a project with such a collaboration form, we have not experience any legal disputes yet. There have not been any particular conflicts yet either from my experience. That being said, it is with no doubt a high level of conflict in the design-build space generally speaking. There is no doubt that in a traditional design-build contract where we are considered a sub-contractor, the main contractor has so much power compared to us that legal disputes are in most scenarios out of the question for our part. We would probably never try to take on a main contractor in a legal dispute because of the disproportion of economic muscles.

C1: As a consultant, I feel that our economy and the processing of changes are being intentionally trimmed in favour of the main contractor, exactly because they know we will not stand a chance against them in a legal dispute. We will of course never take the main contractor to court over a couple of hundred thousand NOKs because of the legal fees. It is definitely speculation from the main contractors towards the smaller

consultancy firms in the traditional design-build contracts, not that we have experienced this with Veidekke.

11. FT: What would you say are the most important incentives for you as a consultant in a construction project? Are they economical, relational, etc?

C1: I would say that the best incentive for us is recognition. For the Ulven-project an important part for us has been the way our work and our position in the project has been recognized by the main contractor and the other participants. This is something that has been lacking in other collaborative design-build contracts and traditional project delivery systems. For us as a specialist company, we are proud to be working at a company which has a lot of expertise and skilled employees. It is important for us to be recognized for the expertise we have and provide to the projects. Of course, this has to be reflected economically through the contracts, but it is important to us to be respected, that our advices are heard and that there is an understanding of the complexity of technical systems. I believe this to be the best incentive.

C1: I must also say, that with the collaboration form we are using with the Ulven-project, it is very pleasant to work. With the traditional design-build contracts it the environment often becomes hostile and competitive, with hard demands on progress and deliveries, and a lot of focus on contract. It often seems like it is an above-down attitude in the traditional design-build contracts. With the Ulven-project the setting is vastly different, with a project organization built on recognition and respect between the participants. This definitely affects our motivation and drive in the project.

FT: These types of incentives might be underestimated compared to the economical ones?

C1: Absolutely, yes! For instance, Veidekke has put in a lot of resources and effort towards team building in the start of this project, including a lot of workshops and social gatherings. There has been a lot of focus on the relational aspect of the project organization, which I have never before experienced in any previous project. This provide us with a sense of community in the project organization before the start of the project. To be able to create such relations internally in a project team is very underestimated I believe. Getting to know the people of the project team on a personal level like we have on the Ulven-project creates a commitment for everyone to deliver better quality, reduce costs and delivery on time.

12. FT: Considering the project owner, OBOS, is not part of the collaboration contract, how do you experience their involvement and how is the collaboration between Team Veidekke DA and OBOS?

C1: We have a close dialogue with OBOS the project owner, where they are concerned about customizing the delivery for their particular needs. They

communicate any additional deliveries that could help increase the value of the project. We have a close and good dialogue with OBOS, which is mainly controlled by Veidekke. I do not consider OBOS as an opponent or competitor in any way though, and we have to impress OBOS with our deliveries as well. A key factor with this project is that Team Veidekke DA is able to deliver a successful project so that we can create a cooperative relationship that can land us more contracts for future projects.

C1: Veidekke is of course very professional in the way they communicate with OBOS. Team Veidekke DA have given an offer, economically speaking, and that offer was part of the reason we landed the contract, that we had a fair price. If we “open our wallets”, we will not be able to achieve this price of course. A key thing about the innovation contest and the reason that we won the contract was about being able to deliver more rational and cheaper apartments for OBOS. So, a low cost of building and a low cost of execution were the criteria we won the contract on. OBOS is of course interested in achieving the 20% reduced cost of building and execution, but also interested in the proper quality of the delivery.

FT: What is the key with this collaboration form that enables you to deliver this project with a 20% reduction in costs?

C1: I would say that it is solely due to the collaborative project team and being able to come up with rational solutions, through a rational form of collaboration. We are not using any different way of constructing and there are no new technical innovations, it is all down to designing rationally across the different disciplines. A typical thing for many construction projects are that you allow architects in particular the freedom to do irrational things in the design phase. This often leads to deviating solutions relative to the standard module. In the Ulven-project we have been extremely true to the agreed upon standard module for the apartments, which makes it easier to duplicate and build rationally. There are way too many housing projects that fall in the trap of designing too complex architectures that makes them very little rational to build.

C1: Usually, with traditional housing projects, the project owner has designed much of the project with an architect before engaging the contractor and the technical consultants, according to the wishes of the project owner and the realtors. That rarely ends up in something that is rational to build. With the Ulven-project, everything was turned upside-down, and OBOS gave Team Veidekke DA free room to organize and execute the whole design phase to achieve lowest possible cost of construction and execution. In that way the architect got room to utilize the property in the best way possible; as many apartments as possible, as rational as possible, with as most quality as possible, and finding a balance between quality and rationality. The team worked together in a very good way to optimize the design, without sacrificing creativity and excitement. In other words, it is a rational but not boring design. In the Ulven-project

we took some action to give variation on the exterior design but keeping the internal design very modular.

13. FT: One opinion from some practitioners is that the project costs tend to accrue during the construction phase, mainly due to errors in the design phase or lack of communication between designers and builders, is this something that is improved in the Ulven-project?

C1: In this project we have been working together since day 1, the designers and the contractor. Veidekke have had a strong voice regarding rationality in the design, to be able to build as efficiently as possible. It is often left up to us, the technical consultants, to convince the architects to make rational designs, but on this project, we have had a lot of help from Veidekke to communicate this from the start. One of the key focus areas has been the gross/net factor of apartment area, how we can have a design that utilizes the property in such a way that we can maximum apartment area from the regulations of the property. In this aspect the architects got very strict guidance from Veidekke on the design.

14. FT: Are there things in the project delivery system you are using on the Ulven-project that you feel could have been done differently? Integrating the project owner, changes to the contract type towards you, changes in the overall collaboration contract, etc?

C1: I think this model is good for this project, where the project owner covers our self-cost through the fixed price of the contract, and where we can influence the possible gains by executing the project in a rational and efficient manner. The collaborative arrangement clearly creates incentives that distinguishes it from other construction projects.

C1: Collaboration models are very popular these days. While the Ulven-project is one approach to a collaborative project delivery system, there are many different approaches that are being tested. Common for most of these collaborative efforts is that they end up in some sort of design-build contract design in the end. Usually some parts of the project are done in collaboration, for example the design, between various stakeholders of the project, until you land a concept for the project. After that, the execution phase of the project is usually done as a design-build contract. I think for many cases, the “collaboration contract” is just a nicer term for a “design-build contract”, since the design-build term has become increasingly negative in the industry. Sometimes, they also like to call it “open-book” contracts, which sometimes is referred to as “open-wallet” contracts, he-he!

C1: From my experience, there are both healthy collaboration contracts and unhealthy collaboration contracts out in the industry. Very often, the main contractor seems to exploit the collaborative phase to get early access and to try to make the project owner make changes that benefit the contractor. The early access also gives the contractor a

better opportunity to negotiate an exclusive price, which I think is their primary incentive to get involved in collaborative contracts.

15. FT: To summarize, is it correct to say that the key incentives from this collaboration contract are the relational incentives rather than the economic incentives?

C1: Yes. To be honest, we did not enter this project and collaboration because we saw an opportunity to earn more money than usual. You can call it a bit of a gamble, where you can potentially achieve a bigger gain than we would in a traditional contract, but there are more risks involved. But it is not because of the potential economic gain that we signed up, it was more because this was an innovative and exciting new way of delivering a project, where we can work more freely and be more recognized. The best part is that we form a team to win the innovation contest, the tendering process, instead of having to compete to get to be a sub-contractor as in the traditional design-build contracts. We got handpicked by Veidekke to be a part of this project, which make us feel that we are valued in a different, better way.

FT: So, long-term and recognition?

C1: Yes. Two very important factors for us.

Appendix C: Transcript Interview 2

Participants:

- Interviewer Fredrik Sørum Thronæs (FT)
- Consultant 2 (C2)

Transcript – translated from Norwegian:

FT: *“Introduction to the background of the thesis”*

1. FT: How large is your company’s share in Team Veidekke DA?

C2: Our share in Team Veidekke DA is less than a couple of percent, so not very big.

FT: And how many from your firm is dedicated to the Ulven-project?

C2: The Ulven-project is considered a big project, and we have 3-4 consultants involved at this time. No one on fulltime though. We will probably involve other people further on in the detailed designed phase and the construction phase.

2. FT: Apart from the general partnership with shared liabilities collaborative contract you have in Team Veidekke DA, what specific contract type do you work under in the Ulven-project?

C2: We are using a contract type with hourly rates with an upper cost ceiling. (payment by the hour / hourly rates based on budget).

FT: Would you say this is the most common contract type you are involved with?

C2: Basically, yes. Either hourly rates with an upper ceiling or fixed price contracts, but we experience most of the time hourly rates with an upper ceiling.

FT: Would you say that the hourly rates contract is more beneficial for you compared to the fixed price?

C2: Well yes, we do. Because this contract gives us more freedom to have a more collaborative effort and agree on which designs are more suitable for the project. Also, with this arrangement, you pay for the actual work that is being done. I believe this is an easy and fair approach to the issue to be honest. We have also been involved in other variants of hourly rates contracts, where for example different types of activities are separated and priced differently, and you get a combination of hourly rates and fixed price.

C2: We have also been involved with fixed price contracts, and our experience is that we rarely earn any money on these types of contracts. I think this is because we generally are too modest at setting the prices of the contracts and end up with prices that are too low. We are also not good enough to calculate and include the risk premium that is added in the fixed price contract. There is also an issue with having many different contractors and project owners to work with, which has different approaches and preferences. For instance, sometimes when we work on fixed price contracts we end up ordering a bunch of drawings and designs that you end up not needing after all, since the contract is fixed price, and no one really reflects upon if this is smart to do or not.

C2: Here in the Team Veidekke DA we are using an hourly rates contract with a very strict upper price ceiling, and we have been told that there will not be any additions to the price.

3. FT: In relation to the potential shared gain/loss in the collaborative contract, is this something you take into account for this to be a profitable contract for you?

C2: Here we have had to take into account the fact that we had to reduce the hourly rates. We went into the collaboration with a reduction in the hourly rates, as part of the package to get the contract. The reduction in hourly rates represents our equity share in Team Veidekke DA. So, everything we invoice in the Ulven-project comes at a discount compared to what we normally would charge.

C2: In relation to your questions about a compensation format, using a general partnership with shared liabilities like the Team Veidekke DA gives us a model that is based on trust. In such a model based on trust, where we are supposed to do things in a smarter, faster and more innovative way, I feel hourly rates is the contract type that has the best fit. Since we are basing our partnership on trust, we should be able to trust the consultants to not spend more time and resources than they have to.

FT: Are these problems you have experienced before, regarding the lack of trust and exploitation of the contract?

C2: Well, we have at least some projects where we surpass our budgets. Of course, it influences the whole project the times we do not get paid after going over budget. For projects like the Ulven-project, which last for several years, the process is important. Things like that the project feels fair and that the different parties do not go on big losses. That is one major point with the DA-model, we gladly go into such a collaboration with a discounted price to be able to be part of the project, to have faith in the concept and be part of an interesting contract design and way of working with many advantages, as long as it is fair and realistic towards us the whole time.

C2: We have a whole different business model than the contractors, and a whole different liquidity situation than they have. We have cost of salaries as our highest factor, and a situation where we are totally dependent on money coming in every month to be able to sustain our business. So, this means that we need to run this as a healthy project all the way, and have margins however small, all the way to be able to be part of this. We are not in the situation where we can sit on the fence for a couple of years and wait on a gain that might come our way.

4. FT: How did you account for the risk of a potential loss?

C2: This is something we have calculated in relation to our ownership share of Team Veidekke DA. We also did some studies on this matter, where a key point for us was to have a large enough share to make this endeavour interesting, but low enough to be able to accept the risk of a potential loss. So, we have done calculations on how much the total loss could be on the project without us going bankrupt etcetera.

C2: But the whole reason that we are part of this project is based on trust. Where we trust Veidekke, that sits with the majority share, run this company in such a way that we will not go bankrupt. If we did not have this trust in Veidekke, we could never have been part of such a collaboration, because we are not prepared to take such a risk by ourselves.

5. FT: Trust and other relational aspects are concepts which are hard to express contractually. Do you believe these aspects to be more important than other aspects, like economic aspects?

C2: Not more important, absolutely no. If you look at this in a twofold way; where you have some, call it qualifications criteria, that are used in other types of tendering where you have to answer yes or no to be able to even get into the contract. Without this relationship based on trust with Veidekke, we would never have been able to say yes to this agreement. There are other things as well, like the fact that we are going to work with each other for many years and that this environment has to be a little hostile as possible. This is important to be regulated in a proper way in a contract, so that this collaboration becomes as predictable as possible where everyone is following the rules and agreements.

6. FT: What incentives do you find most important, economic, relational, more freedom and responsibilities, recognition, etc.?

C2: The economic incentives are not that important in this project I would say. It could be several reasons for that. Firstly, we have not been part of this type of collaborative contract before, so we have not seen how this type of gain would affect our profitability and we do not have any reference on that. Also, we have a very small ownership share, so we know that Team Veidekke DA has to produce a huge gain for

us to have a substantial profit. So, I would say that there are relational incentives that weighs up the most. It is very exciting professionally to be part of a new collaborative approach to project delivery, and that we believe that this could be a model for the future.

7. How have you experienced the start of the design phase for the Ulven-project?

C2: It has been good. However, it has been some challenges in understanding the different parties' business models, and to learn to know each other. The contractor-business and the consultancy-business are very different. Additionally, the different consulting disciplines are also different in many ways, and there are both big and small consultancy firms involved in this contract. Every consultancy firm has the same business concept, that is selling consulting hours. The difference in the size of the disciplines makes it different in the way the firms handles risk I feel. At the same time, this risk is represented directly in the ownership share.

C2: Currently I would say things look good, but there are some hic-ups in the start that we are trying to regulate in the contract. Things like; what do we do with price increases, what do we do with the discounted price, etc. These are small contractual details, that are very important for us in this phase of the project so that we can work in a predictable future. But the most important thing for us now, in the phase we are in, is the feeling of maintaining a fair collaboration where we do not get squashed economically by the others. The purpose of Team Veidekke DA, is to carry out better projects that are more efficient and more innovative, and to work better together. I believe that the purpose of Team Veidekke DA is not to squeeze the consultants so that they earn less, but rather work better together so that everyone benefits financially.

C2: Right now, the situation feels a little bit like this to be fair, where we have been working "for free" in the innovation contest (tender phase) and putting in several hundred thousand NOKs of work for free. In addition to working at a discounted rate, this has become very bad business for us in the short term. But the positive is the order backlog that we hopefully get from this.

FT: So, there are long-term incentives for you in this project?

C2: Yes.

8. FT: In your other projects, are you working under Design-Build contracts under the contractor or under more traditional contracts directly for the project owner?

C2: It is both. But we are working a lot with Design-Build contracts really, maybe 50% of the time at least. Our projects with Veidekke has been under Design-Build contracts. We also have a lot of projects where the buildings are treated as Design-

Build contracts, but the outside areas are separate into traditional contracts. So, we work quite a lot with the contractors as well as the project owners.

9. FT: How do you experience the involvement from the project owner in the Ulven-project?

C2: The project owner has had a clear vision for what the Ulven project is going to become, and it has been both general and specific constraints. For instance, the project owner initiated a concept project which combined all of the visions into one planning document. The details up towards the construction phase is not yet been communicated yet, but this is something we hope we will see soon.

C2: This might be one of the challenges related to the DA-model though. In a such a project delivery system, the consultants are more integrated with the contractor by tying them more together in a team. But the project owner is still on the outside so to say, so it is interesting to see what happens when the consultants and the contractor are so tightly tied together like this, and what the consequences this will be for the project owner and the project itself which is directed towards the end users. These are things we do not know the effect of yet.

FT: Would you say that it could be an advantage to include the project owner in the integration?

C2: Well, I do not know if I am the right person to say anything about that. I am not sure, there are probably both advantages and disadvantages related to integrating the project owner as well. The clue is that one of the parties are not integrated here, and that this party is aware of their position.

FT: Because I know of other projects that have approaches that include the integration of the project owner as well in the project delivery system. The Tønsberg project for example.

C2: Well, the Ulven-project is an industrial housing project. These kinds of projects are very uniform, where the apartments are to be sold and we are building it before they are handed over to the customer. So industrial housing is a bit narrower than many other types of projects. So, I do not know if the project owner OBOS should be included or not. The way I see it, it would be a clear advantage for them to see our side as well. Because we experience that they maybe have a feeling that we are trying to take advantage of them or similar. But then again, this is a classic scenario between the contractor and the project owner, but now we are on the contractor's team and not the project owner's. So, this is a problem that arises in the more traditional design-build contracts, regardless of the collaboration form we are using in the DA-model.

C2: But in relation to the risk of this type of collaboration, the only stakeholder that is not safeguarded in the contract is the end user, the people buying the apartments. Because we, the consultants, that are usually the people that are focusing on both perspectives at the same time, where the end user is important are now tighter connected to the contractor than what we usually are. And the contractors main focus is to do the construction in a most cost-efficient way as possible.

FT: So, this might influence the end product, and hence the end user, in perhaps a negative way?

C2: In the utmost consequence, yes. Therefore, the project owner always has an important role in housing projects like this. Maybe even more important in this project. But they always have an important role, in the regular design-build contracts as well, contract design demands that the project owner monitors the contractor to some degree.

10. FT: In the design phase, are you experiencing the collaboration across disciplines to be better using this delivery system?

C2: I believe that the big difference with this delivery system regarding the design phase is the way the process flows. Veidekke has had a lot of focus on us to get to know each other better, to work more closely together, etc. Every project becomes very personal, and the processes are very dependent on the persons involved. The fact that the persons that are involved in the design phase are working well together and have close communication and presence, is something I think is a very big advantage towards better designing. It is about more respect for each other's disciplines and better collaboration, instead of a competitive environment. This is something I believe is very positive with this project delivery system.

FT: Would you agree that this can be seen as an underestimated aspect of the project? Maybe that there is too much focus on the profits and costs, and too little on the relational and long-term aspects?

C2: Yes, from a consultant's perspective I believe so. My experience is that these kinds of projects is all about the process. Having a good process during all of the years spent on these projects is important. This is the everyday life of people, and it matters a lot. So that is something I really believe. We always work better together after getting to know each other, and project number two is always better than the first etc. This is something Veidekke seems to have figured out, where they are hand picking their partners for their projects. They seem to have realized that a consultant's services are not something you buy off the shelf, but rather something you search for.

FT: Is this a trend that has been emerging lately?

C2: Well, I have been working with Veidekke for many years now, and they have been good at this for a long time. At least the projects I have been involved with. I can also say the same for the other big contractors we have been working with, about hand picking consultants and teaming them up. The only contractors that are not working in this way is the public contractors, because they are bound through public tendering.

11. FT: How is this project prioritized compared to other projects that you are working on, considering the low ownership share and the collaboration contract as a whole?

C2: The Ulven-project will never be given a lower priority than other projects. The fact that we are part of this, have an ownership, a long-term collaboration and feel like we are an important part of the team, will make us always prioritize this project.

12. FT: Do you think this way of partnering and collaboration can be bad for the overall competition in the industry, considering the way you get long term collaborative relations?

C2: No, not at all, for many reasons. Firstly, we are a small office and we are interested in having a diverse portfolio of projects, also there is a limit of how many housing projects we have the capacity to be involved with. Secondly, the big contractors like Veidekke has been working in this way for many years already, where they hand pick consultants for projects and create dedicated teams. They also sometimes hand pick several consultants that have to compete for the contract. It is also up to the different project managers from the contractors how they like to do the tendering and who they want to work together with.

C2: Even though you can do it well on this project, everyone knows that it often does not take much before you can get tired of the people you work with, or want to try something new etc. So, no, it is not that type of competition between the consultants, and it is not these types of consultants that are picked for this project.

13. FT: Have you had any conflicts so far in the design phase, and if so, how have you handled them?

C2: We have tried to account for any possible conflicts in the DA-contract. But I cannot say that we have encountered any particular conflicts so far, we consultants have a close and good collaboration between ourselves and it is working out well. There are always some disagreements, but none that has amounted into any conflicts.

C2: Most of the conflicts that arise during a project does not amount to legal disputes but are rather solved on a smaller scale. Things like design errors and execution errors will probably also arise in this project, but these kinds of errors rarely go to court. But I definitely believe that we are better prepared to solve these kinds of conflicts and

errors better with through our collaboration model, since we are working so closely together etc. But then again it is important that, for example, the consultants are not squeezed too hard on the prices. Because this is one of the primary reasons for conflicts in other projects in the design phase, that the consultant run out of money on their budget and you start pushing work on others and start blaming each other. Typically, things like “you did an error, which means I have to make changes, which cost us money” etc.

C2: Tight budgets are always a source of conflict. Then again, it is even more important if we are going to be able to work well together and delegate task properly, that everyone has appropriate budgets and allocated resources without having to resort to blaming each other for errors and do that type of games. So, the foundation for us to be able to work well together has to be that everyone has enough room to do their work and gets paid for the time consumed. The purpose is that we are working more effectively together, and thus use less hours.

14. FT: What specific contract are used towards you in the Ulven-project?

C2: We use the standard contract NS8401 “General conditions of contract for design commissions”

15. FT: Regarding the design/engineering contracts used towards consultants like yourself, are there anything in these contract designs that you would have liked to change? What would be the optimal contract type for you as a consultant?

C2: Our optimal contract type would be remuneration on the basis of actual time taken without any price ceiling, but constantly defining the delivery of the work. That is our optimal everyday work environment. The disadvantage with that for us, is that we can never have more gains than that we get from selling the hours. But the advantage is that it would be very tidy and fair for us. And again, that we are very concerned about the process in the projects that we are involved with. On some projects we have had fixed price contracts where we see that it works out very good for our part as well. But it comes down to us getting paid for the hours we work, and it does not have to be many hours where we work for free until it has a big impact on our financial situation.

Appendix D: Transcript Interview 3

Participants:

- Interviewer Fredrik Sørum Thronæs (FT)
- Consultant 3 (C3)

Transcript – translated from Norwegian:

FT: *“Introduction to the background of the thesis...”*

1. FT: How far into the design phase are you now? Have you started with the detailed design?

C3: We have done the initial design and delivered the general application of the project but not yet started with the detailed design phase. However, the initial design of this project has been, in many ways more detailed than normal design phases. This is very much due to the collaboration model we are using. Not only has the initial design been more detailed, but also the designing that was done in the innovation contest that won us the contract.

C3: Both contractor, consultants and architects collaborated closely on the innovation contest as a team. Hence, a lot of the people that usually comes in later in the design and construction phase were involved from the start. For example, HVAC consultants and building technique consultants were involved from the start. This means that on many areas we are ahead of what we usually are when sending the general application of the project.

2. FT: Is this the first time you are a part of such a collaboration form in a construction project? If so, how do you feel it has been working so far?

C3: Yes, this is the first time I am involved in this type of collaboration. I think process has been working out very good so far. However, relative to our contract and the payment structure, we have been working much more and been putting down many more hours in the innovation contest than we would have been in a traditional tender process. In this way we have taken bigger risks.

FT: Were you working for “free” during the innovation contest?

C3: Hehe, well it was not more than a symbolic amount you could say. It was a parallel contract, and we got 100 000 NOK per team. This amount can maybe cover the costs of copying, and not even near the real costs. I think we spent maybe as much as 2000 hours in the innovation contest, that amounts to a cost of maybe 1M NOK and

probably invoicing of around 2M NOK. So, for us this was a huge investment and a huge risk.

3. FT: How large is your company's ownership share of Team Veidekke DA?

C3: I do not know the exact figure in my head right now, but it is somewhere between 1 and 2 percent.

4. FT: How did you assess the risks of joining this project, especially in relation to a potential shared loss?

C3: There was uncertainty related to how many hours we would need to put into this project, especially in the innovation contest. This was something we really had to consider. Now after the innovation contest, we received an approval from Team Veidekke DA that since we won the innovation contest, if the project is successful and Team Veidekke DA returns a profit, our costs related to the innovation contest is to be compensated. So, the hours we put in for free is now to be compensated using the eventual profit, before the profit is divided to the different companies based on shares.

FT: Does this influence your day-to-day work, or maybe provide incentives for you?

C3: I would not say that it influences our daily work, no. We will work such that the project and the DA can be profitable regardless of this. This is due to the initial design of the collaboration contract, which gives us an interest for the project to be profitable. I think it is more about fairness, since the architects have been putting down much more time and resources in the innovation contest than any of the other consultants, even combined I think.

FT: Is this because the architects are much more involved earlier than the others?

C3: Yes, and the architects also provide much of the materials in the design phase, which are expensive. It is also often our designs and drawings that are used by the others in their design. So, we are always working ahead of the others.

5. FT: How has the collaboration across disciplines in the design phase been working out, between the different type of consultants?

C3: Very good I would say, in all manners. I think this aspect is working out very well, maybe regardless of the collaboration model we are using. However, it is definitely beneficial to involve the other consultants sooner in the design phase. Especially the building technique consultants and HVAC I would say. For example, ventilation often demands a lot of space in the building, and if they are involved to late in the design phase it is often difficult to customize solutions to their specifications. Also, heating and energy will affect the whole architecture of the building, where you

put windows, how big they will be, etc. So, energy and daylight are very connected, especially in housing projects. We also had the acoustic consultants involved very early in the design phase, and their specifications gave limitations for us. If they have not been involved that early, we probably would have to redesign a lot of the architecture of the buildings or settle with solutions with less quality.

FT: So, early involvement of different types of consultants can help prevent changes and provide better solutions?

C3: Yes, absolutely. And save potentially a lot of money on not having to redo designs etc. Even if you redo the designs later on in design phase, the solutions will typically be of less quality than that of the solutions you are able to come up with earlier, since more of the building design is locked.

6. FT: Apart from the general partnership with shared liabilities collaborative contract you have in Team Veidekke DA, what specific contract type do you work under in the Ulven-project?

C3: Within the Team Veidekke DA we have calculated and given a fixed price ceiling, where we are paid by hourly rates up towards that ceiling. If we pass that ceiling, we will not get paid for the exceeding hours. This contract is something we and all the other consultants have negotiated within Team Veidekke DA.

FT: Are you pleased with this type of contract?

C3: I have a hard time picturing how it could be different. If we have had a pure hourly rates contract with no price ceiling, it would be very difficult to make framework of the total costs of the project. So, I understand that we need to have a price ceiling. Of course, one can think that it would be to our benefit to not have a price ceiling. But then again, if we spend less money than the price ceiling this saved cost would be part of the shared profit. If we had a contract with a price ceiling of 10M, and we only design for 8M, then 2M would go directly into Team Veidekke DA to be shared among the companies relative to their share.

C3: So, this is rather unusual. If we had been working on a different project with a price ceiling (effectively a fixed price), those 2M would be going directly to us as a profit if we had been able to do the design using less hours. But in this project, this profit is put into Team Veidekke DA and divided through share afterwards. This may sound bad, but if everyone else does the same, providing profit for the DA, it will be fair in the end.

FT: This has to demand some trust between the parties involved, that they all are working in this manner, right?

C3: Yes, the trust among the parties in Team Veidekke DA is very important.

7. FT: How do you experience the relational aspects between the parties in Team Veidekke DA, like trust?

C3: So far, I think it has been very good. I think that those that are involved in this collaborative effort really wants this to become a successful project, not only Veidekke but also all the different consultants. But there is a long road ahead, so no one knows how it will turn out in the end. Of course, things might change when if things start to go against you.

C3: It is also quite hard with contracts when you give a price like this on the detailed design of a project. Often it is just a few pages where what this design should include is written down, maybe with some restrictions to how many drawings or how many meetings one should have. But it is very difficult with a design contract to specify what is to be defined as a part of the detailed design and what is considered a change that trigger additional fees. Often, issues tend to be somewhere in between, and I experience this as difficult, when an issue is considered as a part of the detailed design or considered a change.

FT: How have you solved these issues in the Ulven-project?

C3: We have solved it by voicing the issues together within Team Veidekke DA. This demand loyalty towards each other within the DA. For instance, if another consultant come up with something new which forces us to make changes, this would be a part of the detailed design. However, if the project owner come up with new requests, it is considered a change that justify additional fees. Then again, a consultant might come with an alteration that saves the project for a lot of total costs but causes more work for the architect for example. Then you might think that, well we have to redesign so much so that we are able to save the project for a lot of costs, and thus we are entitled to get paid for those extra hours it takes that might surpass our price ceiling. This is something we discuss together within Team Veidekke DA when the issues arise.

8. FT: Considering that the project owner is not part of the collaboration contract, how do experience their involvement?

C3: I experience their involvement as very traditional so far, where they have a contract with Team Veidekke DA and try to get the most out of that. Sometimes they realize that there are additional things that they want, which is not stated in the contract, and decide to pay extra for these alterations. This will then be treated as a change that trigger additional fees.

C3: What may be considered a difference in this project from what we are used to in many other, more traditional projects, is the way we are organized. What is normal for

us is that we are teamed up with the project owner from the start along with a smaller group of consultants that are hired on hourly rates and design the project along with the project owner. In this way we have a sense of ownership to the project. Then we contract a contractor through a fixed price for the job of further design and construction. In most cases the project owner wants us to join the contractor for the next part of the project, but in this case, we change employer from the project owner to the contractor. This time however, it is the contractor along with us that are teamed up from the start and get the sense of ownership to the project, while the project owner comes in later. This may lead the project owner to ask more questions and be more sceptical towards the project, since they have not been as involved as they use to be. So, this time around it is a different issue.

9. FT: Do you feel you have a bigger sense of ownership on the Ulven-project compared to other, traditional projects where you collaborate with the project owner in the start?

C3: I would not say the we have more sense of ownership, no. However, in the traditional approach, I feel that our main objective is to make sure that the project has sufficient quality, while the contractor is trying find the most cost-effective solutions at the expense of quality, and that we always try to look after that quality. In this way, we feel more like the police in the traditional project compared to the Ulven-project where we and the contractor are on the same page from the start, and the project owner may be the one policing to try to increase the quality. So, in many ways our role feels easier on this project, where we have one employer which is the contractor which we have a contractual loyalty towards, instead of having a divided loyalty.

10. FT: What incentives do you find most important in this project, economical, relational, more freedom and responsibilities, recognition, etc.?

C3: I do not think I am the correct person to assess the economic incentives. When it comes to responsibilities, I would say it is not necessarily more responsibility, but responsibility in a different way. I guess there are more economic responsibilities in this collaboration contract compared to other contracts. That you consider the overall economy of the project and not only your own economy.

11. FT: Considering you have a relatively small share in Team Veidekke DA, how does this influence the way you prioritize your projects?

C3: Our ownership share is not very large in terms of percent, but we have a pretty big investment relative to the size of our office. This is about that the cost of design is much less than the construction costs, and that we have invested relative to the design costs of the project. We did not have the ability to invest more money than what we did, which was large sum for us. So, for us this is a big and important project even though we only have a couple percent share in Team Veidekke DA it is a large amount for our office.

FT: Are you working only on the Ulven-project right now?

C3: Yes.

FT: Are there other people from your office that is working on the Ulven-project as well as other projects?

C3: Well, it will be. Now we are in a phase where I have been working alone on this project for a while. But I can imagine we will be up to three people working on the Ulven-project for the next year.

FT: Do you feel that the shared gain/loss can affect the prioritization?

C3: I do not think we have given that so much thought as of yet. But when you say it, we have given some thought towards which people we have decided to involve with the project. That it is people that have sufficient experience and so on. I think this might be due to the fact that this is a pilot project and that it is something new for us, rather than the potential gain/loss. We want to make sure that we do things right, to get the proper experiences and references.

12. FT: How do you consider the long-term relations that are created with Veidekke in such a collaboration form?

C3: The long-term relation is valued highly by us. You could say that when we decided to go into this innovation contest with Team Veidekke DA, we viewed the long-term relation as the primary gain. Especially if we did not win and did not get the contract, then we would have made some relations and a network at least. But when Veidekke came to us and asked us if we wanted to be a part of this, it gives a very good signal in itself, and if we were to pass it down we would have lost a very good connection with a very good contractor. Passing it down was merely an option. So, there are several reasons for us to be a part of this.

C3: Veidekke has hand-picked the team and picked companies they have worked with before and have good experiences with. The other consultancy firms also have Veidekke as an important contractor and hence wants to do a good job for them. We have already seen effects from this, where we have got other contracts and projects because of this

FT: So, there are definitely other incentives in such a collaboration form than the economic incentives?

C3: Yes, absolutely. Both that we can get further work with the Ulven-development, but also that OBOS and Veidekke hires us for future projects.

13. FT: Has there been any conflicts during the design phase so far, and if so, how have you dealt with them?

C3: Well, there has been some “tugs of war” between us and Veidekke, where Veidekke is more conscious about costs and we are more conscious about quality, and to find the balance between those two aspects. We also have in the back of our heads that OBOS wanted innovation, as well as 20% reduced construction costs. This means that it goes without saying that much of the innovation is related to cost savings, and this is something we think is correct and interesting to work towards. But somewhere there is a limit to what you can save on costs without it affecting the quality of the delivery, so there has obviously been some “tugs of war” between us and Veidekke on this. But I feel that when we already won the innovation contest and got the contract, we had already found a balance on this.

14. FT: In relation to the legal aspects of the contract, have you taken into account any possible legal disputes etc.?

C3: Not that I know for sure, but I assume that these contracts are pretty standard towards this. I have been part of the designing part of this team, and we have one level that is the people that design, and then we have a group above this that is more focused on the economic and legal aspects of the contract, not only for Veidekke but also for us and the other consultancy firms involved. This group has had frequent meetings as well, and they have had team building as well. I guess during these meetings they have discussed more of these issues, which I do not really have the overview of.

C3: But we have our daily manager and our legal manager at our office that has been meeting with the other daily managers and legal managers of the other companies, where they signed the DA contract and how the legal issues are to be handled.

15. FT: Generally speaking, what contract types do you feel is best suited towards you as a consultant? Fixed price, hourly rates, others?

C3: I think that fixed price contracts are better than hourly rates with a price ceiling actually. But the easiest for us would be to work on a contract with purely hourly rates and no ceiling. We do this sometimes, at least on the predesign phase of projects since these usually involve a great deal of uncertainty. In this phase we are working on a lot of different propositions, and the project owner has many different perspectives, which means there are many different rounds of designing in the predesign phase before settling on a design. Then you have to comply with the county’s regulations and you get even more rounds of redesign and changes etc. So, you never know how many times you need to redesign and alter the design before you start, making it difficult to set a fixed price on this phase. In these cases, it is nice to have a contract

with hourly rates. Then you can have a cost frame or price ceiling, as long as it is implied that you communicate when you are about to reach this ceiling/frame and then reassess how to proceed.

FT: In relation to such a price ceiling or cost frame, have you encountered contract types that has an incentive fee for delivering with less costs etc.?

C3: No, I cannot say I have. But this is kind of the case in the Ulven-project, where you can see if you can provide more quality that can increase the area of the apartments or other things that might increase the value of the apartments but notice that you do not have enough resources or time to do the needed design, it is only you that can see this. And if you know that you will not get any more money to cover the cost of doing these design changes, it does not create any incentive or motivation to say that “let’s redesign the whole thing such that we can deliver something better” and then you have to work on your free time to get this done. That would probably not be interesting, even though you want it to be at the best possible quality.

C3: But I cannot say that I have experienced such issues, but I can imagine that this could potentially happen, yes.

FT: And in your day-to-day work, does the contract type influence your way of working?

C3: Yes, I absolutely think it can. However, I do not think I have experienced that if I do this work very quickly we can get a lot of profits on a fixed price contract for example. But I think it is more evident when you see that you have reached the price ceiling or cost frame and realize that you will not get paid anymore however much more you design, of course this makes you work as little as possible or do it as fast as possible when you know that all further hours you put down is at a loss for yourself.

FT: There is no incentives to work for free in these contract types?

C3: Hehe, definitely not!

FT: But that could maybe be the case in the Ulven-project with the shared gain/loss in the collaboration contract?

C3: Well, at least if you imagine that if you do not do some things it could create more costs other places. Then it suddenly would be more interesting to do some “free work” since you will be affected as well. But then I believe we would discuss this within Team Veidekke DA and say that “hey, we are actually done with this, but we see that we can save costs there if we do some more designing here” and see if there are room to cover our costs of doing that.

FT: I guess this comes back to the idea of having a trustworthy relationship between yourselves in Team Veidekke DA?

C3: Maybe it has not been that much focus on this particular issue, but so far it has been a very good environment where there is room for discussions. Much of this is due to that Veidekke not only has hand-picked companies, but also the individual persons. These processes are very interpersonal, and the collaboration is very dependent on the persons involved. I have worked with people that has not been as agile and easy to work with, but in the Ulven-project the people are easy to work with. So, it is not always about the companies but rather the individuals, some are easier to work with than others. People that are easy to communicate with and help you straight away, which speeds up many processes. Then you also have people that are difficult and tend to problematize and not take responsibility, which stalls processes.

Appendix E: Transcript Interview 4

Participants:

- Interviewer Fredrik Sørum Thronæs (FT)
- Consultant 4 (C4)
- Consultant 5 (C5)

Transcript – translated from Norwegian:

FT: *“Introduction to the background of the thesis...”*

1. C4: I think it is a positive thing that someone is trying to ask these questions. We have been asking ourselves these same questions from many different directions. We are, among other things, part of a corporate Ph.D. where also other companies from the industry are on board, including Veidekke Property Development, where there is this woman who is writing about “Success factors in construction projects”. It revolves around the same issues, right, how some projects are successful while others are not.
2. FT: It looks like the industry is trying to come up with innovative solutions to solve some of the problems, and some of these solutions are related to the organizational and contractual strategies of both the project owner and contractors. Literature suggest that the industry can benefit from moving towards more integrated project delivery systems, and the Ulven-project is one approach to a so called “Integrated Project Delivery”.

C4: I would say that all of us, the consultants and the contractors, have a common interest in trying to understand each other’s income models and mind sets, and try to understand our incentives and motivations. I would say that to have good projects you need competent people naturally that knows what they are doing, but they also have to engaged. And it is the engaging part that we are going to talk about now, what makes people engaged in the project all the way and how to keep them engaged all the way from when their boss signs the contract.

C4: We have for instance signed this DA-contract, that is a result of a process between us. What I find nice about Veidekke’s approach, is how they realize this aspect of the contract, on how to motivate people and engage them through the project. You cannot do that by only choosing the consultants or contractors that are willing to go furthest down in prices and put together a team where everyone is scraped down to the bone. Because that is a common way of thinking in the contracting industry that you are optimizing the economy by buying single elements as cheap as possible and putting them together. Therefore, it is not that unnatural for them to proceed with that way of thinking when hiring consultants as well. We, on the consultancy side, do not like to be compared with planks and nails. It is a difference in buying a plank and buying an

hour of consulting. I do not doubt that Veidekke and the other big main actors in the industry is aware of that, but by moving from their way of thinking towards trying to find the alternative and ideal formula of procuring consultancy.

3. FT: How large is your company's ownership share in Team Veidekke DA?

C4: Our share in Team Veidekke DA is less than a couple of percent if I am not mistaken. It is very little indeed, and you are already there on to one of the core elements of the problem.

FT: And relative to your business, how big does the share represents?

C4: Well, it reflects in a way our economic stake in the DA company. It may be even higher if you consider the contractual values. But initially that was the formula that was assumed for the distribution of the shares. But we are already here into one of the core issues. We feel that it is hard to find a better formula, but with this small share we have it naturally must be a pretty big profit in order for it to provide us with any significant sum. Often as a consultant you are trying to spend some hours to try to see how you can do things in a smarter way. This does not necessarily mean that they do this for themselves, in most cases this is a process that are done together with the other consultants, especially planning, procurement and production together with the contractor. So, everyone participates, and you can have ideas.

C4: For instance, at Ulven we are looking at this idea to use fibre-concrete in a higher degree, that is, fibres instead of regular reinforcement rods. You think that it would be nice if you are able to save 10M NOK on this for example, and then you have to figure out what it takes to be able to replace these reinforcement rods. For us, as a civil engineering consultant, that involves combining our expertise on calculations and dimensioning with our network and expertise on how standards are compiled and can be challenged. We have an international network on concrete, and Veidekke as well have a good technical department on concrete that has people that are part of the same concrete unions as our people that can potentially challenge the regulations. Because some of the regulations in Norway today are impediments, and it is almost never a straight forward thing, because then everyone would do it. That means that we need to spend hours on assess this issue. Then there is the question, since Veidekke are not going to pay us for a change in the design because of this. When we gave our price, that was the basis for our share, we priced in a "normal" delivery. So, how do you then balance a gain that is a product of several parties' efforts, where maybe in some cases we are overrepresented on the number of hours spent. Let us say there is a potential to save 10M NOK, we are of course not sure about this figure, it might be only 5M NOK for example. But we are pretty sure that we can save a large sum, at least 2-5M NOK. Then Veidekke says that this is interested and that we need to look into this possibility. Of course, we will start to ask who is going to pay the extra hours required to make this happen. Then Veidekke says that they do not have a place to send the bill,

and we have a price ceiling which we will not be paid for costs that exceeds it, because this is something we along with Veidekke has agreed upon with OBOS through our contract. So, this is about increasing the bottom line by reducing the cost and not increasing the income. Then we have a discussion internally in the team, who dares to come up with the money for us to do this effort that might save a lot of money. Basically, it is us that has to cover that cost and provide that risk capital. Therefore, it is not very tempting to do such things in this model, since if we save 2M NOK we only receive a couple of percent of this, and that will probably not cover the hours we have to spend to solve the issue. So, there you have a paradox, right. The model is interesting in principle, because it underpins common goals and if Team Veidekke DA earns money we earn money. Correctly only the amount that your share represents of course, but at the same time you can have certain decisions underway that is such that we feel that we are being “exploited” to save costs that Veidekke gets the biggest share of.

C4: Of course, there are whole series of other cases, take procurement for example where Veidekke is doing all the work and where we do not provide any effort. This is also going to be part of Team Veidekke DA’s gain and could maybe be much more than our case. Imagine if they are able to procure planks and nails 10% cheaper, that may be just as much saved in costs as those 10M NOK I was talking about in our fibre reinforcement example. So, we are aware of that as well. It is kind of a paradox, where if we sit with our glasses on, why should we start a process where we burn a lot of hours which we do not get paid for. On the other side, there is a shared pool for gains, that we might partake in for free.

FT: This means that there has to be a large amount of trust between each party in the DA, to do what is best for the fellowship.

C2: Yes. Because, let us say that if the HVAC consultants have an attitude where they have given a price on a design that is so low that they cannot start to assess all kinds of things to find better solutions. So, the technical contractors might experience this from their consultants, that they do not have the room or the ability to do these assessments. A lot of it is based upon if you are able to maintain the faith in that everyone does their part.

FT: How has that aspect of building trust and faith towards each other been during the Ulven-project?

C2: That has been very good. A lot of effort has gone into that part. There are some people at Veidekke especially that has been key to maintain this “human” aspect of the process, the motivational part so to say. Even the part about creating a contract where you proclaim your intentions and trust towards each other and promise a collaboration in good faith is a proof of at least making an honest attempt at building this team feeling. There is also another element in this that we cannot leave out, which is that as

consultants working in this project, we expect to be able to build a long-term customer relationship with Veidekke as a big actor in the industry.

FT: So, there is a relational incentive in this collaboration form as well?

C4: Absolutely, to the highest degree. There is no doubt that this is a big motivation factor for us, both in this particular project with its possibilities for future contracts with OBOS, but also to see the effect if the Ulven-project is successful and appears as an attractive collaboration model for others in Veidekke which can make us more likely to be preferred as a consultant for other projects. I do not think that it is a big secret that the other consultants also think this way. That Veidekke has an extra value as a customer to us is part of the thing. However, the most important is that we have a genuine belief that we can succeed at this project with this particular team. Like the athletes use to say; “focus on the work ahead and not on the medals”. That is important to think about, that this thing is not only some kind of dream that secures us some exclusive right for future projects with Veidekke. Because that is not going to happen... But if we do a good job in this project, the collaboration form in itself, to be able to succeed at that, is a feat that is important to us and our project engineers. Because it is down there it is all about if you succeed or not. It is when the particular consultant we are using on this project is genuinely concerned about succeeding together with others in Team Veidekke DA that it makes an impact. And I get to hear already at this stage that from our consultant that this is actually working really well, the collaboration and relational part.

4. FT: Compared to traditional design phases, what are the advantages from this way of working together?

C4: From my perspective, one very important part is the early integration. We have never been involved this early in a project before, and for us it is very important to be involved as early as possible, especially with the architects. We also do consulting on geological technique in this project with a company we work together with. But making sure that you are there and turned on when you are going to map out soil conditions or other premises that influence the foundations and optimize the construction pit, that on one side affect the costs but on the other side affect the area of apartments that has a value. Then there is the phase before you have signed a contract, where there is the question of how much soil assessment and etc. one should do. So, it becomes a balance between what is important to find out and to sort out which premises that can affect both costs and progress. This can be affected a lot if you took the wrong assessments, and you really do not want to discover these later because it can create a bad mood and a slow start to the project. From our side this is a good thing to be involved this early, so we do not have to rely on some others work in the preliminary design. We have been involved from the get go when we gave an offer to OBOS for the contract, where we have done cost estimations for our own contribution but also on the solutions with Veidekke and the other technical contractors. We also

had talks about possibilities for saving cost, without going through with them but having them in the back of our heads for the next phase of the project.

C4: This is the phase we are in now, and now we are thinking that in this phase it is important that we try to focus on how to build effective and design effective. What is nice for us is that these two things are very related. If you design a lot modularly in the model, you gain not just on that we can copy most of it during the design but that the construction team also can copy the modules when constructing. Then you start thinking more modularly and industrially. The architects have mixed feelings about this, where they might be concerned about the building becoming ugly to put it simple. So, this is a balance which you have to deal with, such that you do not simply run over the architects and create a hostile environment. We have after all won a contest that includes some sort of final impression.

FT: I guess you would need to safeguard the customers' interests?

C4: Yes, indeed. And this is something that is to be sold, right, so if it looks awful it does not really matter if you were able to build it cheap. OBOS understands this of course and included this in the evaluation our proposal in the contest.

5. FT: In relation to the collaboration contract where OBOS is the only part that is not integrated into the collaboration, how has their involvement been?

C4: I know very little about OBOS's involvement to be honest. I have not been part of any meetings with OBOS so far, except an introductory meeting at the start of the project. But what I have heard is that there has, in a way, been some scuffles between OBOS and the rest. Because it depends a bit on how they do their micro-management, and if they engage a person that in some ways might a misunderstood need to dive down into some things that are on the wrong level of detail. That is how I understand that some of the frustration has been coming from related to OBOS's involvement. So, that OBOS has to remain true to their concept and the premises for the innovation contest and what is the freedom for Team Veidekke DA to be able to manage their own decisions is important, so that it does not become a blister between OBOS and Team Veidekke DA. This is something the project manager and the design manager has to deal with first and foremost, but if it becomes really bad it could lead to cases that affects the consultants as well. For example, reversal of decisions or unclarified decisions.

C4: Generally speaking, I think that the experience so far is that it is very positive that we have been integrated from the very start and that we have a big focus on team building and creating good relations between people, the "soft" side of things so to say, and that it has not been all about contract and economy. It will be interesting to see what we can manage to do, but so far, the signals are that collocation is good. The idea is that we also are going to work with an optimal usage of digital tools in this

project. If we are going to work with full VDC or not... Sometimes you need to assess whether it is smart to go all in on digital tools or not, even if you can and have the ability. I know the project manager in Team Veidekke DA as a very pragmatic person, who has his focus on the costs. We should also have this focus, and if we say to the project manager that this is something we can do, and the other consultants also gets pumped on that idea, but it leads to using more hours, you need to think about where the actual gains are from doing this move. Not only doing things because they seem cool and innovative, since the design team can always get a bit eager when you find fancy methods of doing things. You can put in huge amounts of information in these digital models you know. 4D is also something that I am sure we will use and that is because it is important to have a relation towards time when it comes to planning, design, procurement and production. Then it is the question of how much information should you decide to include in the model, because in some cases the value of that might not reflect the amount of effort needed. Basically, you have the ability to have a very detailed model, all the way down to the location of screws etc, where you buy the screws, the dimension of the screws, which momentum you should use, etc.

C4: You would want to focus on optimizing all of the repetitive functions and look for these types of solutions. For example, a particular span that it would be important to keep for all the modules and not have to adjust by 10 cm etc. This is something that we are laying the foundation for now in these early phases of the project. Veidekke and the architects are very focused on this as well, and they know that designing effectively leads to constructing effectively. This is something we want as well, because we do not have any intentions of designing a lot of different things that could have been streamlined. We would much rather want to work on the creative parts of the design, and it is not the goal for us to make money on copying modules of apartments, but we are on board on that way of thinking nonetheless. If you convince everyone on this way of thinking, you can reduce the costs of design for us as well.

6. FT: Regarding the contract type, are you usually working with fixed price or hourly rates contracts?

C4: Both. If you think about what is most common to use in this type of projects I would say that it is most common to work on fixed price contracts. But it is a bit dependent on which phase of the project we are working on. We are often involved in these types of projects in a preliminary phase along with the project owner to create a basis for the tender for a design-build contract, where we might be on hourly rates with a budget instead. Most commonly however, when we start the detailed design phase and get involved through the contractor, we would have given a fixed price. Then it is a pure fixed price, with no consideration for hours.

FT: The choice of contract type is probably depending on the uncertainty of the delivery?

C4: Yes. We have some variants, like this big project we are on where we have a target price instead. In this contract type we have a ceiling where if we exceed we will not get paid for that and a target price which is typically 20% below the ceiling. If we manage to deliver under or at the target price, we receive a share of the difference between the target price and the ceiling. If we exceed the price ceiling we get nothing, if we are between the price ceiling and the target price we get a reduced rate. It is often difficult for us the price these contracts, and we are not as good as the contractors to assess the risks connected to pricing the contracts. I think that we are too unconscious about these calculations and need to link it towards what we are thinking is right, is it fixed price we are thinking when we price the contract or is it a “best guess” based on earlier projects like price per square meter or a percentage of estimated project cost or something like this. We have a good way to go when it comes to the evaluation of that risk I think. In this case we have a contract where we have a fixed price in a way that we have an upper ceiling and that if we use less hours the saved cost of these ends up in the fellowship of the DA.

7. FT: Considering your low ownership share in Team Veidekke DA, could it be that it is hard to value the resources of a consultancy firm compared to the resources of a contractor in terms of equity in the DA?

C4: Yes. Well, basically Veidekke that has well around 80% ownership share in the DA have this; they have relatively few people involved that has a cost in salaries, but they have the responsibility for procuring materials and performances from suppliers that has collectively a very big value. So, this means that their risk is connected to the procurement and control of these deliveries. If you take a look at procurement costs as an element first, it is all about how good their network on the supplier side is and how good they are in the negotiation, how they can achieve good relations, etc. This again to get good prices because the suppliers can know for sure that Veidekke is controlling them well and is very professional, and that it is stress free to work with Veidekke. They have built such relations with their suppliers through years of procuring from them they will get good prices. And you cannot forego the fact that they are big, which means that they have some sort of power due to their size. They probably will not say that themselves, but a supplier is of course aware of this. So, it always exists an incentive for the suppliers to work with Veidekke, as for us, that if we can provide a competitive and fair price for Veidekke there are possibilities for future contracts.

8. FT: How do the collaboration form influence the way you prioritize the Ulven-project compared to your other projects?

C4: Well, I would say that for the Ulven-project there is a certain focus from the top management side that we have to succeed. For some this project will have a higher priority, but at the same time it is important to point out that priority from our side is also about how we have staffed the project and how we are able to keep these persons

motivated. It is clear that you can suspect us for putting some good people on some projects and some less good people on other projects, but this is not what we feel is the case. But I understand that some can think that to prioritize a project is the same as taking the person that is the best and allocating him. We do maybe like 100 projects during a year, and it is also a case of timing for us, when our specific people are available and so on.

FT: Maybe coincidentally sometimes as well?

C4: Yes, it might be coincidentally sometimes who gets allocated where. It is not like we can lock a person to a project, even though this is what our customers want. For projects that last for some time, there are phases where there is less need for our services, typically the early stages. This means that on one side there is relatively few hours and you think that you can be flexible and have the same persons on different projects, but this is somewhat dependent on if the person that has started the project is forced to jump onto another bigger project, a project that maybe requires them 110%. This might be difficult to avoid, that you feel that the person is less engaged, and you see him less. And then it is often because the coincidences might have led us to decide that we cannot have this person on the bench waiting, and that we cannot tell him to do nothing and do not accept any more work to be able to be ready for this project. At most times we are able to work this out, there is always some kind of flexibility. As I said, in the early phases there is usually not that many hours that are needed. So, in this project we have been able to keep a good continuity in the staffing and are going to have a big focus on keeping the same people on. But this is something that our people want as well. So, the only real danger of finding yourself in a dilemma is if the project enters a prolonged halt. Then, what to do with our guy? A prolonged halt for us might be, even 2 weeks can be prolonged for us, but let us say 2-3 months for instance. Then it can be hard for us to find him something to do while this halt is lasting, because he needs to be ready when the project starts again. It is not always easy to find temporary things to put people on if something like this happens, and this might cause a dilemma for us. But this is not something that is different with this project than any other project I would say.

9. FT: How would you say that the loyalty of your people is towards Team Veidekke DA compared their own company?

C4: I think if you ask our guy that is currently working on this project, he would say that what is special this time is that there is a bigger loyalty towards the team, and consequently the project, compared to traditional projects. This is something I am quite sure of. This is because he has been involved from the very start and been able to add this as a good experience for him since he has been involved now for almost a year. I can see it on him that this project has been very positive for him and for his development as a consultant.

FT: So maybe there is ownership beyond the share you have, a sense of ownership for the individuals involved?

C4: Yes, I would say that.

C5: I think that is due to how they collaborate rather than the share in the DA. I have seen much of the same in offshore projects where people are sitting together and working more closely with each other across disciplines. I would say that is the difference, not necessarily the share our company has in the DA.

C4: Yes, I would say that the percentage share of the DA has less effect than the actual way the collaboration is. It all comes down to the human relations and the “drive” that is created together with other people. It would be the same as if you interviewed someone and ask them “what makes you thrive at your workplace?”, they will probably not put salaries as answer, right?

FT: Indeed.

C4: Even though this has to be in order, there are other things like nice co-workers and interesting and challenging tasks typically.

FT: But these aspects are hard to state in a contract, right?

C4: Yes. But so far, by signing this collaboration contract you are already far ahead. Part of that contract is about things like common goals and respect for each other, which are relational aspects. It states that we are to work towards common goals, that we are rigged for closer collaboration through the DA, that we have a common interest in common success and that everyone has to think about the big picture and not only about their contribution. So, respect for each other, being innovative, sharing of knowledge and having focus on costs. This is a result of a process where also our employee has been a part of, where they have had several social gatherings including a 2-day gathering in Gothenburg. This has been a nice thing, where we did some sailing and stuff and had meetings at a hotel where we worked out the relational aspects of the collaboration contract. This is an important part of the sense of ownership towards Team Veidekke DA and towards the goal we put forth.

10. FT: Regarding conflicts and any potential legal disputes, have these things been discussed within Team Veidekke DA?

C4: We have not taken that much consideration into any eventual legal disputes contractually yet, since the overall contract with OBOS is not yet signed. We are currently working on an agreement that is more like a letter of intent, with an understanding that this is something we can agree on. But the overall design-build contract with OBOS is going to be signed now at the end of the month after we have

come up with a revised price. So, we are in a phase now where we have to recalculate a bit. It is about a process where which we, after sending the framework application, have gotten comments from the planning and building agency which has made us do some small changes on the design. Not many changes, but enough for us all to have to do some recalculations on their own contributions.

FT: The reason for me asking this is that the literature suggests that project delivery systems that are more integrated have a lower number of legal disputes that go to litigation, with the argument that since everyone is in the same boat it would be more beneficial to work together to solve the problems rather than blaming each other. How do you experience this aspect in the Norwegian construction industry?

C4: There are many issues in the Norwegian construction industry that are characterized by legal disputes. For example, things like disagreements on what has caused some to use more hours than planned and who has to pay for this. Notifications of change and notifications of deviations, and associated legal disputes are sadly a big part of our industry.

C4: I do not know exactly how it is expressed in the Team Veidekke DA contract, but I know that we have discussed it on a general basis. I cannot say that I have seen it been formulated anywhere yet though, but we have used the usual standards for the consultancy contracts when we have given our offer.

11. FT: What contract are used towards you within the Team Veidekke DA?

C4: We have used the NS8401 “General conditions of contract for design commissions” when giving our proposal for the job. It includes some rules about how to handle disagreements. But, we have given an offer for the job which Veidekke knows they cannot demand any more money for us unless there is a concrete change coming from OBOS, so that Veidekke can demand more from them. The essential understanding of how this collaboration is going to work, is something Veidekke has been working quite a lot with. They have explicitly made us understand that we cannot come with notifications of additions in our deliveries without, A: can show that the money needed is reflected in the saved costs of the project for doing the addition or change, or B: it is a change that we can take to OBOS and say that they have to pay for. For A it includes things like reduced construction costs, like what we talked about might cause one of the consultants to spend unproportionable amounts of time and money. This is something that is real, and something we have to find a way to deal with. Because, if you have to cover these costs by yourself it might lead to the wrong decisions. Then you have on the one side those who has the biggest share like Veidekke, that loses most on these wrong decisions. Let us say that it was smart to to such a change, but we will not do it because we do not want to use 50 hours or whatever to get it done since those 50 hours is a pure cost for us.

C5: Actually, you should have created a pool in addition to the shared gain/loss.

C4: Like an innovation/evaluation pool!

C5: Yes. Then the project management can decide during the project which initiatives the team should put extra money towards. Then you can at least decide where you want to allocate resources as the opportunities arise. Then the impact of the ownership share is less evident.

C4: What I think is hard to understand before you have experienced it in the real life, because we work in a different project with a different model, is that innovation is really something that takes place in two phases. It may be pretty evident now when I say it, but for us it can be that we use hours and resources to evaluate solutions and then we get the “no”. For instance, if you look at evaluating something that can lead to cost savings on construction, we might agree with Veidekke that we can have a look at it since it might be good for the project. Then, imagine we use 20-40 hours on this evaluation and put forth a note or summon a meeting and assess the positives and negatives, and especially for the procurement division of Veidekke that can have a calculation of the costs of doing this in an alternative way. Imagine then that they say “no, we will not do this”. Who will then pay for the 20-40 hours that we spent on the evaluation? Because there is no more money to cover this cost, and it is this part, this pool, that it could be smart to have to cover such issues and to be able to do the evaluation. Because the next step would be if the decision is “yes, let us do that. This was smart, and this can save us 10 times the amount”. Then you get the dilemma, where someone would say that this is ok because then you receive your few percent of the 10M NOK that we save. You will have them in a while, but the hours you have to spend now you will not be compensated for. Since, you often end up doing an evaluation and then make a decision, and then it leads to even further costs for us to actually go through with the decision. This can amount to hundreds of hours for us in addition to what we have budgeted. But we can all agree that this would have been a reasonable decision to make, considering the overall cost savings. Then they can say the we should use 1M NOK to make that 10M NOK cost saving, but we have no ability to spend 1M NOK extra if we have a contract for 3M NOK. We cannot afford spending 1M extra on this, and how can I then go my daily manager and explain to him that the project for us went with 1M deficit because we agreed to do some more work to save 10M in total costs for the project? Where is the logic in that? And you cannot come and say, “hey, but we get to have 200k NOK because of our couple of percent share”, right?

FT: So, there are room for improvement in the way you divide the share gain/loss in the overall contract?

C4: Yes, I think there is something there. I think at least there is something regarding this that we need to dare to have a discussion on. Because if not, I fear that this model might not work in the end. Specially if we get scenarios like I just explained.

FT: And I guess these are scenarios that are realistic as well?

C4: Yes. Worst case, one discipline ends up with a 1M NOK in extra costs and the project saves 10M NOK and then they receive 150k NOK in the end. There is no incentive in that for us. That is actually a little dilemma. Like I said earlier, this works both ways. If Veidekke does a procurement of, let us say wall elements, which makes them save 10M NOK, we will receive 150k NOK from those cost savings as well without doing a thing.

C5: But then again you have to ask if this is within their scope or this is something extra for Veidekke as well or.

C4: That is true. Can you compare an effort that is really “bartering” let us say, towards the suppliers, against the effort of evaluating and making design changes? I understand that Veidekke’s size like I told you, and Veidekke’s expertise and Veidekke’s supplier network is a value that they bring in. And the people working on the project from their side is skilled and good at planning and procurement, they are good at controlling the construction processes and so forth. This is at the whole time their expertise, and it multiplies their share value because of their big volume.

FT: And this ownership share, how is this estimated? Is it based on provided equity in Team Veidekke DA?

C4: Yes, I think it is as easy as that.

FT: Maybe it could be worth looking at how the shared gain/loss is divided between the companies? If it should be divided proportionally with provided equity, or divided with respect to who covered the costs that led to the cost savings or something like this?

C4: I think this is worth looking at. I think that this is kind of the elephant in the room. There are a lot of good things in this collaborative model, but some things that we have discussed now are real for us. You might risk that the model does not work as intended because you might have scenarios like we discussed.

C5: Also, because this is an innovative project, and part of what Veidekke already have with their suppliers, agreements and procurement methods is already accounted for when trying to win the contract with OBOS. Team Veidekke DA does not get all of those gains, since a lot of it is used to win the contract with the project owner.

C4: If you look at it from Veidekke's perspective, you can argue that we are lucky to be a part of this and to get the opportunity to team up with them and win the innovation contest. So, there is no definitive answer. I can see this from Veidekke's perspective and say that it is not very logical that they should give away a bigger share, since they do contribute a lot through their people, their supplier networks and the fact that they are big. Hence, they have some power in this sense, that they can get good prices. Maybe this is factored in already or maybe it is something that happens along the way. A lot of it is probably factored in when they estimated the contract, I think about the procurement and estimations based on previous experience etc. But, if you start the project there is still a lot you can affect when having skilled people like they do on this project, that are focused on the costs all the way and has done these types of projects before, and make sure that the others do not get lost on the way. It is clear that it is not easy to say who deserves the biggest value out of the different parties involved. Our employee that is involved is the project manager role and is important in relation to that we together are able to focus on the costs and effective construction, which in turn can make us succeed.

C5: I also think that it is natural that Veidekke has the share that they have, and that it is rather the cost coverage one should look further into.

C4: Yes, because I think it can lead to, in the worst case, that we can start to say that this could be interesting to have a look at, but we need money to cover the costs. Then we get the answer that there is no money to cover it. The money we need to first do the evaluation, and then for the consequence of doing what we found in the evaluation. Then they would say that we had something initially, "what about the hours you had budgeted for the initial work, they could probably cover this" etc. Then you also get the discussion on how realistic this is and so on, and then you start to suspect each other for trying to exploit these innovation processes to create room for yourself to demand changes and additions in the contract.

FT: Because changes agreed within Team Veidekke DA is not considered as a notification of change that warrants additions in the contract with OBOS, right?

C4: You are right. I guess there is nothing wrong by sending some notifications of change to Veidekke that we know that we will not get additions for by OBOS, and deal with it like this. But, it is as I said, we need to have a discussion on this on how to deal with such issues. It might be that it is more orderly that we have some sort of formalized way of stating your demands, even though these are demands that go internally in the DA-company. So far, we have not had any talks about notifications of change like this. The principal is clear from Veidekke, and that means that it is no more money except from what we can get from outside the DA. So, there has to be some place where you can cut costs by doing the changes, or else it will not be worth doing it.

C4: Sometimes the handling of changes is a factor as well. If you are progressing well, changes and suggestions can be disturbing because they come too late, right. Then you start thinking about a good suggestion, but you are not able to determine the impact this will have on the progress. So, even just evaluating a suggestion for change where it might be too late, the handling is important. Because, it is the same people that are being engaged to evaluate if this change is good or not at the same time as they need to complete their other tasks. Then something like a 4 hours meeting might be enough to impact the progress. So, having a project management that has the grit to say that it might be a good suggestion, but overall it will not be worth it to disturb the organization with this right now. Having good leadership on these issues is very important. I think Veidekke has a lot of expertise on this, to have people that understand the time aspect of innovative processes. Because a lot of times good suggestions have a tendency to be embraced and it is the same people that will have to do the evaluations. So, you need to think about the consequences of accepting such suggestions. Sometimes you might say yes even without the evaluation, and that is even worse. Then people become frustrated and confused, he-he. When you are not included in the decisions and suggestion you lose the sense of ownership towards the changes as well, which can be scary. Then it quickly turns into an environment where people do not care, saying things like “ok, I can do this I do not care”. You cannot have an organization like that. Everyone needs to be self-driven, have a sense of ownership to their plan and progress as well as the quality they deliver. If you do not have this, you get a completely different organization. So, it does not require much for it to go from the autonomous organization where people get their tasks and solve them how they see fit and get the responsibility themselves for pricing and quality, where they participate in the fellowship with their expertise but are trusted by the others to deliver. But if the leadership turns into a “point-the-finger” type of leadership, and starts to say things like “no, no, no, not like that”, it will be very destructive for an organization.

FT: One of the theories in the literature is about the difference between the collaborative project organization and the competitive project organization. Where one could argue that you rather want a collaborative one.

C4: It is all about creating a commitment through trust. Since trust is something you need to earn and is not something you can just demand. But, the organization and especially the management, need to be very aware of that through their leadership style they can affect this a lot. It is a very good start to be able to work with the best tools and the best people, and the idea of working so closely together. That being said, Veidekke has been very aware of this and put a lot of effort towards this aspect, the “soft” side of project management.

FT: An important, but maybe underestimated aspect?

C4: Yes, I would say that. I think that, generally you can recognize whether it is at work or in a private setting, that it does not help how good and skilled people you

have as long as you cannot make the cooperate. If you do not have that part with you, the part that you as a leader need to facilitate, you will not create good results. To be able to make sure that your organization is not only sustainable economically, but also relational or social. It has to be sustainable on the soft side as well. And of course, you need some clear rules on different things, you need to have schedules and clear agreements.

12. C4: I can summarize by saying that this model is good in a lot of different ways. It creates a lot of enthusiasm towards common goals. I cannot see how they could have done much differently, because the things we have been talking about now are things that we will need to discuss in the end anyway because it can, in the worst case, create some noise because it is about money.

FT: So, it is worth discussing the shared gain/loss and how this is to be divided and how costs related to innovative and positive changes are to be covered in a fair way?

C4: Yes. Fairness is the keyword here. You have to have economical sustainability for the project overall, but it also has to be fair and be economically sustainable for each party as well.

Appendix F: Transcript Interview 5

Participants:

- Interviewer Fredrik Sørum Thronæs (FT)
- Consultant 6 (C6)

Transcript – translated from Norwegian

FT: *“Introduction to the background of the thesis...”*

1. FT: How large is your company’s ownership share in Team Veidekke DA?

C6: Our share is less than a couple of percent, and that represents only me and my contribution. This share represents how much each contributes of hours.

2. FT: What contract type is you used towards you when you are working on this project?

C6: Veidekke and us have an agreement that lasts for one and a half year that is based on a 100% position that constitutes a certain number of hours of work. We have negotiated upon a certain hourly rate that covers our costs including salary, taxes, etc. The way we do it is that I record my hours that the project manager has to approve, then we withdraw those hours from the budgeted total amount of hours. In addition to this, I am working on other subprojects at Ulven for OBOS through my company, which has a contract that is based purely on hourly rates where I record my hours every month for approval. The hours spent on these subprojects are not part of the budget for the Ulven-project with Team Veidekke DA.

FT: So, you have an external contract with OBOS in addition to the one with Team Veidekke DA?

C6: Well no, directly I have my contract with my company, which then has the contract with Team Veidekke DA. Every party involved in Team Veidekke DA has a contract with each other that constitutes this DA company. None of these individual contracts are the same when it comes to compensation, since everyone has negotiated their own contract. But all the contracts are approved by Team Veidekke DA.

3. FT: How do you feel the collaboration form has worked out so far?

C6: I think it has been working out very well. But I am familiar to working in teams and with collaboration contracts in general. Before I started with this project, I was involved with a project that was developing a big office and commercial part of Oslo city centre. In this project we were working closely with the contractor, the

consultants and the project owner. I was involved in contracting the contractor and drafted proposals with the lawyers from the project owner to create the contract. In this project we had a contract that involved, firstly collaboration in the design phase with a target price, and if the design phase was successful and we reached the target price the contract would be merged into a design-build contract for the rest of the project. So, the contractor had won the contract before we started to design and then we had to deliver relative to the premises we had put forth. This means that we did not need a new round of tendering to have the design-build contract, since this was part of the prize of reaching the target price.

FT: Did this collaboration contract involve any shared gains/losses as with the Ulven-project?

C6: No, not any shared pool of gains. But if the contractor was not able to collaborate with the consultants to reach the target price that was set by the project owner, they would lose the following design-build contract and we could pick other contractors freely. The target price changed during the progress of the design phase, but this was due to additions from the project owner and other factors. For example, we decided to not have offices after all, but rather a hotel, and it goes without saying that the price of these two things are not the same. I was then sitting in a collaboration contract closely with the contractor, but on behalf of the project owner, and had to control the calculations with the project owner to see if they were reasonable. The positive about this way of collaborating is that you expose costs that might else have been hidden, costs that might not have been communicated from the contractor to the project owner at the start. Because, if the project owner does not make a request about such costs it is not always that the contractor feel committed to letting the project owner know about them. When you are in a tender phase and the project owner specifies something, you as a contractor give the price for that something, even if you see that this other thing might have been better. The project owner needs to be open to this and provide room for doing these decisions. This is what the collaboration and especially this contest did, to provide more freedom in relation to what you were to deliver. The task was not only to deliver a building, but also to find something that was good quality and cheap. Everyone can build something lame and cheap.

4. FT: This earlier project you were talking about, this could be an example of a purer IPD-contract where the project owner is involved in the collaboration contract as well. Regarding the Ulven-project, where the project owner is not part of the collaboration contract, how have you experienced this difference?

C6: I actually think this is a disadvantage. A very clear disadvantage actually. I notice this now when I am working. Usually I am working very closely with planning authorities, public agencies and others, and try to be ahead of any eventual negative answer. Have a dialogue with them underway, so that when you get the answer you know that it is a positive one more or less. Having more security and using more time

and effort on it but knowing that you will not get a rejection and start over. Then you have an uphill battle, working towards the answers instead of getting the approvals. Excluding the project owner in the collaboration has the effect that they will not be allowed to communicate with these planning authorities, and this is something OBOS is not used to. They are used to run their own project management, and therefore very unusual to let go of this. So, I understand that this aspect might be problematic for them, because then they might feel like they are losing control. But if they had been a part of the collaboration, where I understand that they cannot be part of creating a company like Team Veidekke DA, but still they could be more closely involved. Then they might not have to feel that the other parties are taking their part of the project management.

FT: But there is another area of the Ulven-development where OBOS have decided to do it in a traditional way, right?

C6: Yes, this area is not using a collaboration contract.

FT: I think it was mentioned that your project had surpassed this other project in progress, is this true?

C6: Yes.

FT: Might this be due to the collaboration form?

C6: Of course, there could be many reasons for this. But, recently I was called by the project owner that wanted names of the people I had been talking to because he was going to do the same approach on this project. So, the key is a close dialogue. And a good dialogue. It does not help to just send a formal letter, you need to meet face to face and have that chemistry you know. I have been working as an architect for many years in Kristiansand, a lot with regulation plans and to get them approved. What is important is that the authorities have an important job where they are responsible for administer an area and I understand their perspective. Then it comes down to being honest, this is what we want, how can we get within the regulations, are there areas where we can meet in the middle, how can we make this building as good as possible. Can we do something, and you do some approvals, so we can make this happen together. Most times these things are rather positive, for example this project we had down town, where we initially were not allowed to change the exterior stones, but this was changed to allowing us to use exterior stones as the ones that had been there previously to retain the expression of the building. What was positive about this was that the building became better after this decision, since the exterior stones were falling apart. You will not have these decisions for you if you are having a rock-hard stance towards the planning authorities.

5. FT: Regarding the shared gain/loss in the collaboration contract, how much does your share constitute out of your total business?

C6: We have never before been part of this kind of project. We usually do no work with such innovation contests, and this was something totally new for us. We are a project management consulting firm, that work on invoicing hour by hour straight forward. So, the idea of being part of an innovation contest and work for free for a year which would have been the case if we did not win, was considered a huge risk for us. Very unfamiliar to not invoice hours and have a stream of money coming in. So, I do not think that we would have been comfortable with a higher percentage share even if that were offered.

FT: And how did you manage the risk of any eventual share loss in case the project was not a success?

C6: Well, the risk is that you lose any potential gains. You still have a regular design-build contract with OBOS through Team Veidekke DA. We have a contract to build, and in this contract the hours for the construction and management is included. What you could potentially lose is the profits, and you will not get compensated for all those hours you spent initially. Those hours will probably not be covered in the first project anyways, but if you get more projects following this, you get to cover the hours in the end because of the added volume in our orderbook. But if we only get this one project, and it does not succeed, it will not be good. But that is a risk, a high risk. We all had to take this to our respective boards. One goes into this with humility and respect on both sides. The project owner has respect for form of the innovation contest, that the team has invested a huge amount of time and resources, several million NOKs, to even be able to be a part of the competition. It was not that many contractors that had the financial muscles to be part of such a competition. The real gain is that if you get to build all these areas, and get to redeem these options, it becomes an extreme synergy effect of having this on you resumé in relation to getting future projects. So, as long as you have a long-term perspective on this, you will gain in the end. But it would not make sense to create a company like the DA for one isolated project, since you could have collaboration without an own company. But having an own company like the DA, ties you to the mast.

FT: So, could you say that there might be more semi-financial or relational incentives rather than purely financial incentives in this collaboration contract?

C6: It is more about the fact that everyone is working towards common goals, and that all are dependent on everyone else to make this successful and get the subsequent projects.

FT: So, long-term incentives for sure?

C6: Yes.

FT: So, it is not about the percentage share and the potential of receiving gains through this share that triggers you?

C6: Well, we earn money anyway in a sense. Because a little percent share of a potential gain will not amount to much. It is more about being part of such a big project that is important. It could be interesting financially if my company could involve 20 more people and bump up the share you know, but that is not the case, it is only me. Veidekke, that has the biggest share, has all their people on board.

6. FT: What contract type do you usually work under in projects like this?

C6: It can be a contract type with an hourly estimate.

FT: Where you have an estimated budget to remain within?

C6: Yes. And if there are changes or alterations you notify that you may have to use more hours etc. Or you could simply follow the project from start to end, where you are involved on full-time, and are paid through your arrangement with your company. In this case it is not estimated any number of hours, but that you are a project manager as long as the project lasts. That you are expected to be there 100%.

FT: Have you been working with fixed price contracts as well?

C6: Well, for the most time... In this project I am working towards a price ceiling. On the project I had before I was following the project and was paid for as many hours as needed, within reasonable limits of course. I actually had a request here the other day, where I got the question about why I had so few hours, because I was writing down just the minimum amount I needed. And they were a little surprised at how few hours there was!

7. FT: Regarding the design phase, how would you say this collaboration form has influenced aspects like quality, time consumption and costs?

C6: Well, if you think about the competition phase, we landed much faster on solutions. During this phase we had workshops every fourteenth day, we had a two-way agenda where the first part of the agenda was about questions brought up and discussed at the last workshop which was to be concluded or defined. The second part was more loosely, where we brought up what was to be solved within the next fourteen days. Then people worked individually, and we communicated through mail etc, to be ready to conclude on the next workshop. Everyone was invited to the table, and everyone was part of these workshops. We are talking about architects and fire security consultants being able to get on the same page and be considered in an equal

way. This was very unusual for the architects, considering I am originally an architect myself, to be able to showcase your project all along the way while you were designing. It can be a bit vulnerable for them, since you want to showcase something that is good and not that which is in the midst of your work. Because this is a process, like painting a picture. But here they had to do this, so we were able to get all the way down to the details. So, we put forth some premises, like we are having it this way, we are going to construct it like this, not that, more of this, less of that, etc. and locking more and more of the design as we progressed to have the freedom to be creative around this but not within so that not everything flows freely.

C6: This made us able to dive deep into the details and able to give the framework application after we had won the contest. This was probably one of the reasons that we won as well, since we were very thorough and integrated. Even the realtors said that this was something they could post on the market, compared to the other contributions that maybe was looking very fancy and nice but did not include enough details and specifications. The reason that we had to wait for a year even after winning the contest, was because after our delivery there were some huge changes to the project. Suddenly the project owner wanted a kindergarten for instance, which demanded a lot of evaluations and we had to redesign almost everything.

FT: This was a change requested by OBOS, right? So, this would be considered a notification of change?

C6: Technically it is only a change in the process phase since we have not signed a definite contract with OBOS yet. But it is considered as a change in the request. Because the planning authorities said that in this are you should this many kindergartens. We could have said that we could include the kindergarten in the next building, and that we could design such that the two would be finished at the same time. But since they are more concerned about taking one area at a time and see how things go and no do more projects at the same time, we had to include the kindergarten. And since the other areas was not supposed to have a parking lot, we had to include this as well. So, we had to solve all these problems in our first project here. Then we found out that they wanted increased utilization of the regulation plan, not 100% but 106-108%. We worked a lot with this, figuring out what we could get acceptance for doing. So there has been some changes, where should the kindergarten be, should we have this, should we have that, etc. This is because OBOS had not yet decided on how much utilization they wanted. This has been part of the revised contest concept, where we gave an estimated price and estimated a revised price including framework application. Then there have been some more changes after the planning authorities has entered with some new input that directly affects the number of hours for us.

C6: However, nothing of this has been contractually stated in a design-build contract yet. We are starting this in the last negotiations now after week 17. We will try to land

this contract pretty quickly, since they want to have landed the design-build contract before starting the sale of the apartments which is in June. So, this has to happen now in the end of April or start of May. This is not something entirely new, they have gone through the contract propositions and several rounds of negotiations regarding prices from last year. But it has to be some changes, the kindergarten will add extra costs and the land appears to be worse than what we were told in the report they sent to us, that we were going to work out from. They supplied an examination of the land and it appears to be worse soil conditions with more water than what they initially thought. This demands a more difficult way of construction, where you need more waterproof constructions which is more expensive.

8. FT: Regarding the low ownership share of the consultancy firms in Team Veidekke DA, do you feel that the shared gain/loss provide the correct incentives? Considering doing extra effort to save total costs, and the fact that the gain from this may not cover the individual costs?

C6: We know from experience, that in the beginning you have a lot of hours available on your budget, then suddenly as the project progresses you may get greedy on your hours since you notice that you do not have much left. So that is why we constantly have trimmed the design phase in the contest, since we did not have the contract yet. If we spend much of the hours in this phase, and there are lots of changes in the detailed design you may end up with too few hours left to do it. And there are no one that works for free, right. I got involved as a part of Veidekke housing development department for some while since they needed me there anyways. So, I did not start to eat from my hours before January, but I have been sitting here since May last year.

FT: And regarding the dilemma if you have a scenario where one of the consultants may find a solution that could save a lot of total costs for the project, but may not be willing to do the evaluation because the cost for them is more than their share of the gain from doing said evaluation?

C6: This has been one of the questions in the discussions. We are exploring the process along the way since we have not really done this before.

FT: So, you discuss these issues together and try to find solutions?

C6: Well, yes. At the moment the work you do has to be within the estimated or budgeted number of hours you have been allocated, because there is some wiggle room in place since from experience we know that there always is some back and forth. When it comes to the particular changes that we have done now in relation to the planning authorities, which the project owner has not been requesting. Because they got an increase in the utilization of the Ulven area and wanted more utilization on the Ulven B3 area rather than on our area. Then we have to do a job, which we really would not need to do, but we have told them that this has to go as additional work and

that they have to pay us extra hour by hour. So, in this case we have made sure that the architect in this phase have had his costs covered for these changes that they have had to do. We have been able to get cover for the costs at most times until now.

C6: However, you have to remember that these are not complicated buildings. We cannot really do much more on the design to reduce costs now since we were so detailed in the competition phase. So, there is not much room left to reduce costs on the design phase, we are through this phase now, and the reduction of costs now is going to be how we streamline and rationalize the construction. This part is what Veidekke is going to be doing. It will also be about finding good and fair priced products and not choose the most expensive suppliers and be able to get good prices from the suppliers. We have for instance had a good dialogue with the kitchen supplier, where they are thinking about doing something special for this project and serve it in a totally different way. In this way they can provide a much better price for us per kitchen that what they would normally do, because of the big volume. There is a lot of work that goes into getting reasonable suppliers. The design phase constitutes only a small part of the total costs, where it is the building in itself which includes the majority of the costs, the materials and all the people needed to do the construction. We can save costs on how we work, that we are more streamlined, that you do not have to wait for half a day, that there is constant progress in the construction, that you follow the schedule and that you have a system for how people get to the site.

9. How do you consider your loyalty towards Team Veidekke DA compared to your own company in this collaboration form?

C6: It is satisfying that my company get credit in the news and get mentioned for being part of this project. That makes me proud and it is good for getting new projects to my firm. But on a daily basis my loyalty is towards the Ulven-project and the team. We become an entity that tries to do what is best for all parties involved. In this sense I am just an employee at my own company. Where I am employed is not that important regarding what I am doing and why I am doing it. My perspective is the same: to make this project as good as possible together. So, in this sense I am working for Team Veidekke you could say, and I could just as well be employed at one of the other parties in the team.

FT: How about the other consultants in the design team?

C6: I experience this with especially the architect and the civil engineer. The civil engineer also works in another collaboration project, which is a little different and not with a DA company like we have, so he is used to work in such an environment. Also, the architect is used to work like this. The landscape architect is getting more used to it, since they are used to more traditional approaches where you might not think that much about the entirety. But the architect is more used to think about rational solutions and reduce costs all the way, and that it does not necessarily have to be bad.

FT: Regarding rational solutions, do you feel that by integrating the various disciplines this early, you get a better cooperation towards such solutions?

C6: The engineering disciplines are always thinking super rationally and used to never getting everything into the model. In this project we decided on some designs with strict limitations and had the architects work around this. We have been thinking more rationally towards our solutions than the B3 field at Ulven. We have kitchen – hallway – bathroom always, and we have decided that this is not going to be deviated whatever the cause. Then you get the hallways, and the walls like this and not all over the place so that Veidekke has to spend a half day more to cast. Of course, this may come across as kind of monotone, but if you live in an apartment here it you would not care how the apartment next to you looks like from within as long as you are happy with yours.

10. FT: Since OBOS is not part of the collaboration contract, how do you feel the customer's interests are safeguarded? Considering OBOS represents the customer here.

C6: Well, OBOS is kind of representing the yesterday's customer if you would like, since we are used to having it like this. We have been challenged by the management of OBOS on what you think we should build now and in the future. How can we have good residences 20% cheaper? Then we cannot think like we have always used to, but rather what can we do to make this happen. Be more assertive. This is what I meant by that it would be an advantage to have the project owner more closely integrated. Even if that was the intention with the innovation contest, and it was they who initiated the contest. It was the management that initiated the contest, and it is us that are going to carry out the work. We work all the time at trying to succeed at the collaboration, where we need to have team-building etc. But, it should be more team-building with the project owner, because it makes it makes it engage everyone. It can end up becoming a "us vs. them" scenario instead, and that is not good at all. That is completely backwards and traditional, to think that we are the project owner and they are the contractor and a you start to suspect each other. Things like "why are you thinking this? Just to save money?", "no, because it becomes much faster to construct and would be positive for the progress".

C6: These are things we have discussed with the management at OBOS. Things that we are going to have. We are going to have a workshop-day where we sit down and agree upon some common goals using big words and create enthusiasm. The reason we have not had this with OBOS yet, is that it has been a lot of back and forth with the planning authorities because this is the first project of a big housing development. They have to consider a lot regarding this, roads and infrastructure and city environment and inclusion of the urban environment agency and everything. There are a lot of authorities and agencies that are coming in that has a lot of meanings, and this is a bit difficult and slow in the start. But, as long as this first Ulven-project is

approved, the ball will start to roll much faster, because it will create the premises for the following projects and that we do not have to take all the battles again. Then you will have the proper progress. So, you can say the progress with the project owner is a bit slow. I am used to be on the project owner side on projects, hired as their representative to help them against the contractor. This is the first time I am on the contractor's side. I understand that you can get an "us vs. them" way of thinking. You have to find common ground.

FT: So, you are for integrating the project owner in the collaboration contract?

C6: Well, I would not want to integrate into the DA-company, but rather want them to behave more like we were on the same team. Because I do not feel that is the case right now. We have a common project, but as I keep telling the project owner, I want you to sell this for as much as possible so that you get success since then everyone will get success. Then the project will be a success. Not about we should make most money and you should make most money, but that we should be successful. Then the Ulven-project will become a success and we all win.

11. FT: Have you had any conflicts so far, and if so, how have you dealt with them?

C6: Oh yes, there has been many conflicts he-he! But, no seriously, we took the initiative to have a meeting where we brought up how we should talk to each other. Because we felt that some things were presented very untimely, and that you cannot communicate like this. We cleared the air pretty good during this meeting. Then there is a bit about that the project owner has a negotiation technique where they are likely to compress the contractor a bit, saying things like "you should not be too sure", "We have not signed any contract yet" and "We could have chosen someone else" etc. It becomes a bit unprofessional, and instead we could say that "let's get a contract on the table and start this project", that would be much more uplifting. You can make the contractor want to give a good price by being positive instead of compressing them. It is the way you communicate really. This provides much more drive.

FT: And within Team Veidekke DA?

C6: We have had a good dialogue there. The only thing that has been somewhat unclear and discussed really are things like; is this included in the pool or is it extra? Can we ask the project owner to cover these costs or do we have to cover them ourselves? This is the interface, since it is the first time, that creates discussions like these. To find the form of the model really.

FT: How did you deal with this?

C6: We discussed it together, mailed with each other and talked with the project owner asking them if this was extra and stuff like that. So, we have solved it through dialogue.

12. FT: Have you considered the possibility for any potential legal disputes?

C6: Yes, we have considered this in the contract. This contract is going to be finalized now and signed by everyone, the final DA-contract. Because this contract will not be finally signed until we have a final price for the project, because then we know the final sum that everyone will be contributing with.

FT: The reason I ask is because one of the arguments for more integrated project delivery systems are that it will lead to less legal disputes because everyone is in the same boat and it should be less appealing to solve conflicts by going after each other legally.

C6: We given this a lot of thought indeed. We have also been thinking about this because I am responsible for getting the BIM up and running. Since, now everyone is designing up towards a common platform, where the updates are live. All the involved companies have access to the model and to each other's work. This means that I can open the model from the architect that he is currently working on, and of course you need some strict rules. You do not mess with each other's models. Since this is actually a legal matter, when these 3D models are very expensive to build. I also had to think about keeping back-ups in case of misfortune, and there are routines that are not 100% in place yet. But having that extra security in case something happens in a hectic phase is nice, because this can also create conflicts between companies. Otherwise, if someone designs wrong this is dealt with according to the standard consultancy contracts (NS8401), and all the companies have their own insurance. This is why it is a good thing that the collaboration company is on a DA form. Because if it had been an AS, the smaller companies would have been liable if Veidekke went bankrupt for instance. Under the DA structure you are only liable according to your share.

FT: What about if one consultant or one company does a mistake in the design, would there then be an incentive of not pursuing this with legal action since you are together in a DA-company?

C6: Well we solve the problems rather. There are always some small things. Just recently we discovered that nobody had thought about one thing. Fire consultants had come in, where we had a technical consultant, fire consultant, the landscape architect, the main architect, everything was planned. We had a road-engineer that had consulted us on the radius of the road in the backyard. But there was nobody that had thought about the little rule that the fire department had themselves, that you need 4 meters of free height. Then we had this balcony that was pointing out in this little open space,

and we had to remove this balcony last week right before the sale-drawings went to print. This was one of those “oops!” moments. But, these are things that happen. It does not say anything in the tech, it was just that the Oslo fire department had their very own rule. There are so many rules, and you really just have to try to look out for each other. When we discovered this, we had to contact the project owner that the balcony was disappearing, then we had to redesign some and inform the people building the 3D model to change this. So, this was a bit bad, but better to discover it now than later. Like I said, things like this happen. If only the architect had been involved, we may not have discovered this, and it would have been way worse if the project owner had sold this apartment. If you then had to remove it, it would have been a legal case for the customer. In this case we got to remove it before any customers had seen the designs. So, there was no crisis.

13. FT: To conclude, are there anything special you think is working out better in this project compared to traditional ways of delivering a project?

C6: What I think may be a vulnerability, is that it gets very dependent on the persons. Because a DA-company like this will not be better than the persons you have on board. It demands that everyone is very dedicated. Us that are a part of the innovation contest are very engaged, but if several of the key persons leaves it will be hard to get the new people coming in to have that same drive and enthusiasm. This is because it is not established yet to work in this way, and you may quickly fall back to the old way of thinking where you think about yourself, you write this number of hours and you want additions. Instead of thinking that you work these hours because it will make the project much better and then you do not really think about it and you are rewarded in the end. Because it is unusual, especially for the consultants, to think like this. Veidekke is very familiar to working like this, where you can give more for free because they have such economic muscles and such big volume of projects. They can lose one project and then win another, but most other parties do not have this opportunity. The important thing now is to have people with the correct mindset, on how to think long-term and to think rationally all the way.

FT: You can say that a lot of this being a success comes down to mindset, culture, relations, etc.?

C6: Yes. This is something we have to work more towards, and something we are for sure not done with yet.

FT: So, perhaps there are more semi-financial and non-financial incentives that could be the key rather than the purely financial incentives?

C6: Yes. But for the big participants it may be more about the financial incentives, the contractors that are constructing, because of their big shares in the DA. They would

potentially profit a lot from this, and that is why they were doing it. But for those with smaller shares, it is more about being a part of it.