University of South-Eastern Norway

Shipbuilding Projects in Norway

Joint Risk Management in Shipbuilding Projects

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MASTER THESIS

May 2019

Abstract

In today's shipbuilding industry there are no contracted obligations or tradition for collectively manage risks jointly between a shipowner and a shipyard throughout the shipbuilding project's entirety. This thesis aims to discover and understand the active risk management motivation from each side, and identify possible benefits with implementing Joint Risk Management (JRM) in shipbuilding. The on-land construction industry has in the latter years experienced success with the use of a new project approach, named Integrated Delivery Project (IPD). Such an approach opens up opportunities for both parties which traditional project approach prevents. The research methodology used to achieve the thesis aim is a qualitative research strategy. Through semi-structured interviews, empirical data were collected from high-ranked practitioners primarily within the maritime domain at shipowners and shipyards, but also on-land construction industry with experience of IPD implementation.

Findings suggest that risk management is conducted to a various degree within the shipbuilding industry, and may be due to different risk attitudes amongst the companies. There is identified a change in actions and perception of risks when the project in hand is conversions of already built vessels in comparison with newbuildings. Further, multiple potential benefits of implementing JRM in shipbuilding projects are found, but which will require a change of today's pre-defined roles, project climate, and new contractual conditions.

The study has both practical and theoretical implications in addition to suggestions for further research within contractual matters and mechanisms of tactical approaches between the two parties.

Acknowledgements

Firstly, I would like to thank my supervisor Lars Christian Iversen for the encouragement and constructive feedback during this process and sharing his network for recruitment of informants, which enabled me to complete this thesis.

Secondly, I would like to thank all the participants in this thesis that made room in busy schedules to participate, the friendliness and hospitality that were met at the corporate visits of each one.

Thirdly, I would like to thank my employer, who has been incredibly flexible and made it possible for me to combine a part-time job and full-time studies.

Fourth, and not least, I would like to thank friends & family for the unconditional support and motivating words over the past five years, helping me accomplish this goal.

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1. Introduction

1.1. Background

Shipbuilding contributes to the continuous renewal of the world's floating tonnage fleet and is carried out worldwide. In comparison with other industries, the shipbuilding industry has a very specific character. In the interest of building a ship, it involves utilizing a wide range of equipment, materials, and competence, and can be considered as a project. The dimensions of such an industrial product project require substantially man-hours to handle the necessary fittings and fixtures of the ship type being built (Mandal, 2017). Newbuilding's to be sold falls under the category, the newbuilding market, which is one of four closely related markets today's sea transport services consists of (Stopford, 2009). The initiative for a newbuilding usually comes from the buyer, in other words, a shipping company. Although shipyards historically have started construction of ships as "emergency work" or on speculation, this is somewhat seldom (Meland, 2006). Mandal (2017) emphasizes the fact that a ship is not a mass production product, as the market is run by the customer (the shipping company). The shipping company will specify what type of requirements the end-product should have and be delivered with.

Projects are becoming a widespread way of doing business and accomplishing tasks. Rolstadås, Pinto, Falster, & Venkataraman (2014) emphasizes that all projects share two important characteristics. Each project has a clear and unique objective or goal in mind, and secondly, the execution of the project is handled by an organization that is temporary and disbanded upon completion of the project. Flanagan and Norman (1993) (as cited in Taron, 2014) pointed out that construction projects often are one-off enterprises. Therefore, risks normally are subjectively addressed with the solution of adding an approximate contingency sum (Kangari & Riggs, 1989). Rolstadås (2008) defines risk as to the probability that an event will occur multiplied by consequence involved if it occurs. To gain a better overall understanding of the risks involved in a project and supervise it, risk management is normally conducted. Complexity and strategic nature of its products, involvement of various stakeholders, and extensive production duration are some of the project factors Taroun (2014) lists when claiming that the construction industry can be considered as risky business. This is also factors transferable to shipbuilding. A shipbuilding project today is highly likely to have been collaborated between different stakeholders from all over the world. A vessel being

delivered to the end-user in Norway might have a hull being constructed in Eastern Europe, suppliers from different nations, all which could potentially increase the need for a higher degree of collaboration, strategic project implementation, and communication, to ensure quality and time of delivery which the initial contract indicates. Although the shipowner may influence the overall risk management by being active throughout the project, it is ultimately the shipyard who is obliged by contract to deliver a ship, to a specific date to a fixed price. This introduces a number of challenges for both parties.

In practice, what is shared between the two parties is what is agreed through the signed contract at agreed intervals. It can, therefore, be argued that the obligations and responsibilities of each contracting party are allocated through the conditions of contract (Rahman & Kumaraswamy, 2002). This opens up the possibility for subjective perception of how the progression, quality, and risks within the project lie in a given project phase. In a newbuilding project, the owner is focused on controlling and approve the vessel based on ship design and technical specification that is thoroughly prepared. In a ship conversion project, the balance of power is shifted more in favor of the shipyard. A shipowner wanting to convert a vessel for another operational purpose is faced with a great challenge in specifying what work to be done by the shipyard. One example of this is that the shipowner cannot know for certain the condition of the vessel until it lays on the blocks. This opens up for the shipyard taking financial advantages of any additional work outside the scope, also known as change orders (C/O).

A standard shipbuilding contract used in today's negotiations, neither adds guidelines for a high or low form of collaboration in terms of risk management. It may be part of the reason why joint risk management (JRM) which is characterized by identifying, assessing, and responding to risks jointly between the parties involved is not yet seen in a shipbuilding project. However, by drawing an analog towards land-based construction projects, there have been development in both collaboration conditions and the way of solving it contractually. Integrated Project Delivery (IPD) used on land-based projects differs from traditional project approach. IPD agreements are unlike traditional contracts relational versus transactional, thus the contract is based upon mutual trust, transparency, and clear communication by all

(Hoelsher, 2018). Some of the benefits achievable with the IPD-approach are found to be fewer C/O, less financial and contractual issues, and risks are collectively managed and appropriately shared. This contractual approach does not exist in the maritime domain, except for extraordinary circumstances where the parties involved has no basis to foresee the outcome, as for example pilot-projects such as autonomous vessels.

Matei & Chirita (2012) analyzed operational risks at a shipyard and identified seven different categories: Client, Contract, Financial, Technical, Producer, Suppliers, and Internal. The magnitude of a shipbuilding process could be massive, considered the high-value-added manufacturing and the complexity of certain vessels. Although with varying degree of complexity present, risks are not necessarily possible to eliminate. A shipowner will for an example face financial risk in terms of loss in earnings if the ship is delivered late or delivered with unacceptable quality. The shipyard, on the other hand, may struggle with late material or equipment deliveries from sub-suppliers, slow documentation flow generating delays or shortages in design ship speed at sea trial.

Chapman & Ward (2011) argue that proactive management of important uncertainty leads to benefits beyond improved control and neutralization of threats, in fact it can enhance project performance. These potential benefits are dependent on both scope for the project and quality of the uncertainty management processes carried out. Dikmen, Birgonul, & Han (2007) argued that in order to facilitate risk assessment, individual knowledge, experience, intuitive judgment and rules of thumb should be structured. Taroun (2014) found in his study of better modelling and assessment of construction risk, a shift from perceiving risk as an estimation variance towards considering it as a project attribute. Taroun (2014) further concluded that understanding project vulnerability is crucial for advancing construction risk assessment.

1.2. Research Question

Risk management is an integral part of project management. Some risks can be foreseen in an early phase of a project, while other risks are difficult to predict. Due to responsibilities and obligations is allocated through the contract, the risk management carried out internally from both sides are normally kept as a secret. The lack of transparency, communication, and trust between the shipowner and the shipyard, can facilitate for post-contract opportunism. Merely when there is obviously common ground for joint collaboration, risks are managed in an open dialogue together, thus a dynamic approach to risk management. There may be significant benefits or opportunities for both the shipowner and the shipyard to jointly assess and manage risks both in complex newbuilding's, in addition to conversions.

Therefore, the research questions in this thesis are as follows:

1. To what degree is risk management used as an active process in Norwegian shipbuilding projects at shipowners and shipyards?

2. What are the possible benefits of Joint Risk Management between owner and builder in a complex new-building or conversion project?

1.3 Thesis Outline

The thesis consists of six chapters, in addition to each of their sub-chapters. The first chapter presents a preface for the following research questions, the purpose of the study and the research question in itself. The second chapter covers academic perspectives and arguments that are relevant to the chosen research question. In chapter three, the research methodology used to investigate the issue is elaborated. Presentation and discussion of the findings derived from in-depth interviews which are by research method accessible follow in chapter four. Chapter five highlights any new or conflicting findings in light of the presented theory from chapter two. A concise conclusion with an answer to the research question, in addition to further research suggestions, represents the final chapter six.

2. Literature review

In order to identify possible benefits of JRM in shipbuilding projects, it is essential to introduce some of the mechanisms in shipping, contracts used in shipbuilding and the contract process. Further, the shipbuilding process, risk management and tools to handle the types of risks present in such projects, and an alternative way of handling risks jointly is described. Given the scope of this thesis, newbuilding's built on speculation by the yard is neglected.

2.1 Shipbuilding

One of the hallmarks of the shipbuilding industry is that there is a high degree of a cyclical industry. Volk (1994) illustrates this with the following description of the industry; "Shipbuilding is characterized as by heavy fluctuations of demand over the short-term and by high inertia of supply. This fact leads to brief phases of prosperity and long phases of depression" (Stopford, 2009, p.629). The industry of shipbuilding is further characterized as highly global. Throughout the history of shipbuilding, the geographical distribution of new ship construction has shifted from European dominance, capturing a market share of 80% a century ago, until Japan in the 1950s increasingly took over due to a boost of economy and an organized shipping and shipbuilding production. South Korea first entered the market in the 1970s, at a time where Japan and Europe dominated with a combined share of some 90 %. Well-planned and organized industrial production along with low wages in comparison with Japan and Europe led to world first position for South Korea within 2005. China, on the other hand, has only become a dominant player recently in the 2000s as a result of strategically actions to develop heavy industry activities combined with economic boost (Ecory, 2009).

Ecory (2009) divides the shipbuilding industry into two different segments; ship construction and marine equipment. The ship construction which entails ship repair along with conversions focuses at the larger commercial sea-going vessels. The marine equipment segment concerns all products and services supplied for the building, conversion and maintenance of ships, along with technical services in the field of engineering, installation and commissioning (EMEC, 2011). This segment has developed into playing a more important role over time. Historically the shipyards themselves carried out the shipbuilding work, but due to technological progress, the marine equipment industry supplying the shipyards today has increased substantially. The contribution of marine equipment based on

product value, Ecory (2009) assess, has reached 50-70% and even higher for specialized vessels. EMEC (2011) estimates marine equipment delivers up to 75% of a commercial ship and, up to 85% of the value of a passenger ship. Thus creating strong ties between suppliers and shipyards.

In a shipyard, often many projects and processes are being performed simultaneously by both the shipyard's own work teams and subcontractors, thus illustrating a complex and time-constrained environment (Zhang, Ma, Loke, Kumar, & Chan, 2012). This thesis tries to uncover the possible benefits of collaborating in terms of risk management which might improve project execution for all parties involved, with the shipyard and shipowner in particular and what tools are available to conduct risk management in such projects.

2.1.1 Shipbuilding contract

A contract is used when entering a shipbuilding project. This fulfills the shipowner's desire to buy a vessel to operate and the shipyards ambition to earn money in the construction of vessels in their invested shipbuilding facilities. A shipbuilding contract is, therefore, a declaration of producing and delivering a vessel from the shipyard to the shipowner. From the moment both parties involved agree, a temporary business relationship is established to achieve the technical objective, that is to say, the vessel. The contract seeks to define the relationship between the shipowner and shipyard by imposing the rights, responsibilities, rules of conduct and assignment of risks between both parties. The contract covers issues for all anticipated technical, cost and schedule elements, including questions or disputes that can appear. The shipowner and the shipyard are both in a position to agree on how C/O are solved through the contract. This is an important element, as the shipyard is subjected to the risk of cost and schedule overruns and the shipowner experience increased risks on the performance of the basic or adjusted scope of work. How to assign these risks is up for discussion in the contractual process, but what is normally used is fixed price contracts or fixed price C/O, different distribution of those risks for each design and performance parameter, and for each following C/O through amendments to the contract (Fisher 2008).

Shipbuilding covers a wide field of complexity, from technical complex prototype vessels to a long series of standard tonnage. This also is reflected in the choice of price format

determined in the contract, illustrating who will bear the risk of cost overruns. With a fixed price format contract, the shipyard is contracted to deliver the vessel completed, including what may be agreed-upon changes. Technical complex vessels, with new technology or innovative propulsion type, may introduce the shipyard to unknown risks which can cause cost or schedule overruns. Thus, the shipyard can argue for that fixed price contract is unrealistic in terms of the increased risk on their behalf. An alternative to a fixed-price contract is where the shipowner accepts and offers to use what is called cost-plus contract. This price format suggests that the shipowner shall pay all the costs at the yard and the "plus" is determined by the use of either a formula or a fixed amount that is paid to the shipyard. A third option might be to share the cost of overruns between the two parties. In other words, how the two parties allocate the risk of cost overruns is determined through the contract form (Fisher 2008).

In order to achieve some consistency in the contract relation between shipyards and shipowners, the majority of all shipbuilding is based on a number of standard forms of contract. These contracts are all, to a high degree, similar in both structure and content, although three out of four can be perceived as more beneficial to one of the parties. Four of the most common standard forms of contract:

1. Norwegian Shipbuilding Contract (Ship 2000) - Norwegian Shipbuilders Association and Norwegian Shipowners Associations
2. SAJ - Shipbuilders Associations of Japan
3. CESA - Community of European Shipyards Associations
4. BIMCO NEWBUILDCON 2007

If one were to rank these contracts in favorability SAJ and CESA is two builder friendly contracts, Ship 2000 is an agreed document between the two parties, whereas NEWBUILDCON is prepared by the buyers' interest without yard contribution (L, Iversen, personal communication, March 2019). To illustrate what a shipbuilding contract entails, the preamble of the Norwegian Shipbuilding Contract is listed in table 1 below;

1. Definitions	11. Ownership, risk, and insurance
2. The vessel, description, and class	12. Default provisions
3. Price and Payment terms	13. Assignment
4. Adjustment of contract price - cancellation by the buyer	14. Taxes and duties
5. Approval of plans and drawings and inspection during construction	15. Patents, trademarks, copyrights
6. Modifications and changes	16. Buyers suppliers
7. Test and trials	17. Notices
8. Delivery date and delivery	18. Entire contract
9. Delays and extension of time for delivery (Force Majeure)	19. Governing law, dispute and arbitration
10. Warranty of quality	

Table 1. (SEC, 2019)

The contracting process of shipbuilding can be executed like figure 1. on the next page illustrates. The shipowner has a contract strategy in order to secure a signed contract. Through the market survey, potential bidders may be identified. To help the owner ensure that the right bidders are identified, a pre-qualification process is carried out. The shipowner sends out an inquiry to the potential bidders with a list of criteria's. These criteria's might be clarification about; financial status, political situation, relevant references, available capacity, track record, HSEQ issues, and expected price level. At this stage of contracting the two parties, the shipowner and the bidder's are communicating. Based on the bidder's response to the pre-qualification, it allows the shipowner to short-list the number of potential bidders.

Buyer	Interaction	Bidder
Procurement/Contract Strategy		
Market survey Long-list of Potential Bidders	← Informal communication →	Marketing
Prequalification	Inquiries → ← Response ← Meetings →	Prepare pre-qualification
Short-listing of potential bidders		
Prepare: Invitation to Tender (ITT) / Request for Bid (RfB)		
ITT/RfB		
ITT/RfB	Issue → ←clarifications Answer clarifications → ←Submit Bid w/qualifications and exceptions	Decide to bid Prepare Bid Internal approval of bid
Tender/Bid		
Evaluation of bid i) Technical & ii) Commercial	Clarifications → ←Answers	Answer clarifications
Short-listing of bids w/approval		
Negotiate	← Meetings/Letters etc →	Negotiate
Letter of Intent / Contract with subject		
Approvals (board or similar)		Approvals (board or similar)
Clear out "Conditions precedent"		Clear out "Conditions precedent"
Effective contract/PO		

Figure 1 (L, Iversen, personal communication, March 2019)

An invitation to tender (ITT) is issued to those bidders remaining on the shortlist. The bidders may at this stage decide to bid or step away. ITT entails clarifications on conditions of the contract, technical specification, project milestones requirements, and price format. The last step in this contract stage is submitting the bid. The shipowner then evaluates the bids, and if necessary seeks clarifications on some aspects of the submitted bids. The technical specifications are of particular interest. The successful tendering shipbuilder will prepare a building specification for approval by the shipowner or the shipowner's representative. This will form an integral part of the contract between both parties and thus legal status (Eyres & Bruce, 2012). Information normally included in the technical specification:

- A brief description, essential qualities, and characteristics of the ship
- Deadweight, cargo and tank capacities, etc.
- Stability requirements
- Quality and standard of workmanship
- Trial conditions
- Machinery details and electrical installation normally a separate section of the technical specification
- Principal dimensions
- Speed and power requirements
- Survey and certificates
- Accommodation details
- Equipment and fittings

The final contract stage in the contract process is the letter of intent (LOI). The LOI is a preliminary agreement and is legally binding, A LOI encompasses; description of intentions of the final contract, scope of work and terms of compensation during LOI period, subjects or termination clauses. As the LOI has a limited duration, termination of the LOI is legally available if the full contract is not in place within a certain deadline. Through the contract process, a shipbroker is quite commonly used on behalf of either the shipowner or the shipyard. The shipbroker assists the process and is only entitled to a percentage of the contract price if the newbuilding is built (L, Iversen, personal communication, March 2019).

In the interest of attracting buyers to the shipyard, one has in recent years delayed a higher percentage of the payment until delivery of the ship, hence beneficial to the shipping company, rather than equal payments spread over the contract period (Eyres & Bruce, 2012). This is an indication of the balance of power between the two parties. While the shipping company prefers a lump sum payment on delivery and completion of sea trials to earn interest on its money and to have sufficient funds to complete the vessel if the shipyard is unable to do so, the shipyard prefers to be paid in advance to be able to pay for materials and labor without borrowing money. This contradiction is often solved with the comprise of a number of progress payments when specific milestones have been passed (Caldwell, 2002). The payment schedule may be as follows:

- 10% on signing contract
- 10% on arrival of materials on site
- 10% on keel laying
- 20% on launching
- 50% on delivery

2.1.2. The concept of projects

Before introducing what a shipbuilding project entails, it is essential to clarify what a project encompasses. A look into project literature provides several different definitions of what a project is. It would be reasonable to argue that the Project Management Institute (PMI) is the foremost quoted source in project literature. Therefore, their definition of what a project is important to present. PMI (2013) defines a project as follows;

"A project is a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates that a project has a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exist".

Turner (2009) on the other hand, first defined a project as:

"A project is an endeavor in which human, financial, and material resources are organized in a novel way to undertake a unique scope of work, of given specification, within constraints of cost and time, so as to achieve beneficial change defined by quantitative and qualitative objectives".

Turner (2009) later revisited this definition and adopted a less prescriptive definition and focuses on the key features;

"A project is a temporary organization to which resources are assigned to do work to deliver beneficial change".

This exemplifies to some degree the number of various definitions of what a project is. For the convenience of this thesis, the definition of a *project* provided by Gido & Clements (2014) is applied; "A project is an endeavor to accomplish a specific objective through a unique set of interrelated tasks and the effective utilization of resources."

2.1.3 Shipbuilding projects

The shipbuilding industry, which is characterized by the ETO (Engineering-to-Order) production mode, is typically a project-based industry (Zhang et. al, 2012). Normally, a shipbuilding project is both very large and complex (Han, Yang, Li, Sun, Zhou, & Wang 2017). When designing a ship, the decisive requirement is that it can trade profitably, thus economics is of high importance. An owner will based upon the initial investment and future running costs, require a ship which will give the best possible returns. The owner's focus areas are: control, approve, provide owner's supply, prepare for operation and take delivery. This differs from the builder's focus areas, which are design, procure, build, test and deliver. Figure 2. gives an overview of the shipbuilding process.

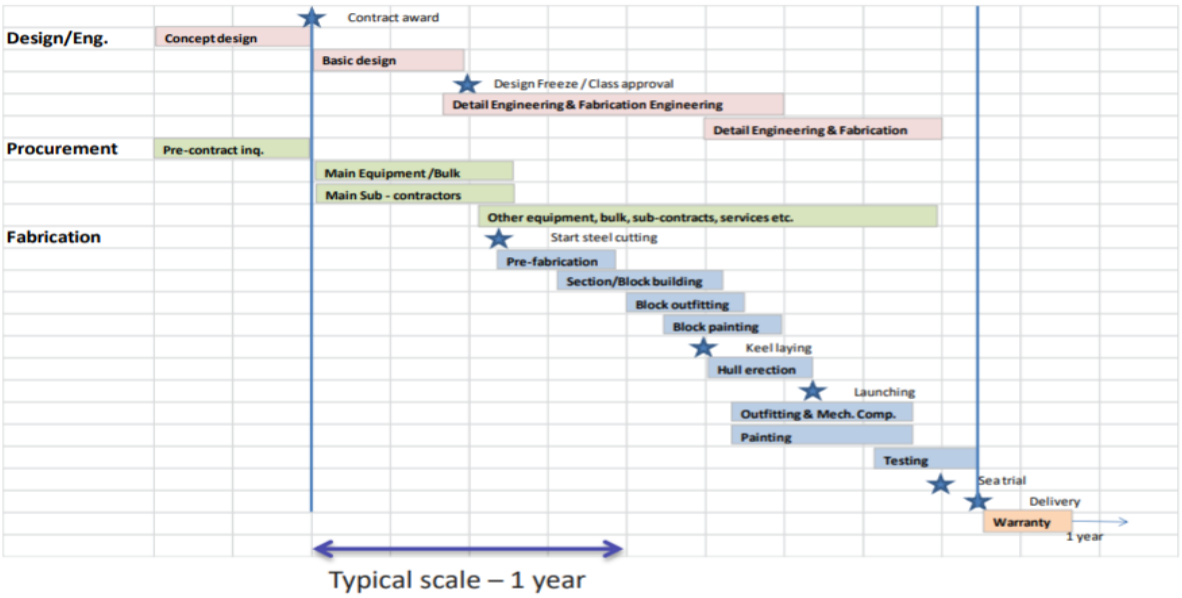

Figure 2. (L. Iversen, personal communication, March 2019)

The initial design of a ship is generally developed through three phases: *concept*, *preliminary*, and *contract* design. Concept design, which is developed before the contract milestone, should based on the objectives, provide sufficient information to be able to assess the best alternative in relation to techno-economic matters. In order to conduct such adequate evaluation, some of the economic criteria's measuring profitability are net present value, discounted cash flow, or required freight rate. The preliminary concept which is not listed in Figure 2, but previously discussed in the contracting process, is the phase where one may refine and analyze the agreed concept design. This aims to increase service performance.

Final arrangements and systems agreed and in compliance with the shipbuilding contract conditions provide what is called contract design. The design of the ship is not settled through the three initial design phases. Post-contract design requires an affirmation that the ship which is entailed to be built will meet safety requirements from regulators as well as fulfill all operational requirements (Eyres & Bruce, 2012). Given that the two parties have signed the contract and post-contract design has been performed, the materials the design requires is procured by the shipyard. Due to the risk market dynamics impose, a shipyard might procure the necessary materials even before the detailed design given that the contract has already been signed. This to exploit a window of opportunity when material prices are low, which will reduce building costs.

Modifications, also known as (C/O), might be very disruptive to the shipbuilding process. Aarseth, Rolstadås & Klev (2016) carried out a survey including project managers, project owners, and project participants within research and development, construction, and oil & gas sector. The main challenge experienced from the practitioners' perspective was changes made in the project. One item in the standard contract, *modifications and changes,* covers this aspect. A C/O can potentially have a serious effect on both costs and delivery date if waived in the latter stage of fabrication. Even though a global market creates opportunities for better solutions or technology for a lower price, it increases transaction costs. Therefore, late delivery from suppliers may force involuntary adjustments in the project plans.

Projects based on unrealistic assumptions impose the risk of increased costs and time. C/O's may as well increase the conflict level as the shipowner might experience a shipyard pursuing any opportunity to make claims, whereas the shipyard might struggle to document increased costs as a result of the C/O. Thus, many shipyards will refuse to accept C/O's once a design is agreed, detailed work, and purchasing commences. The contract item *modification* and *changes* also take into account any cost or delays of compulsory C/O's associated with the amendment of laws, rules, and regulations of the flag state and class society (Eyres & Bruce, 2012).

To be able to stay competitive on the contract price for newbuilding's, Norwegian shipyards often outsource the fabrication of the ship hull to low-wage countries such as Romania, Ukraine or Poland. Some shipyards even invest in a shipyard facility in these countries, to increase their supply chain. While other shipyards simply order ship hulls as a standalone order. Often this entails that the vessel is not present at the yard from the key milestones steel-cutting to launching. After launching takes place, the vessel is then towed up to the shipyard of delivery. Only some outfitting and painting, as well as all testing, is conducted at the final shipyard of delivery. This may introduce risks for both parties at the early stages in the project in terms of health safety and environment (HSE), along with the quality. A shipowner would require that the level of HSE throughout the project, especially when constructing the hull, is of such standard that all work is conducted safely. This, of course, in order not to risk life being lost, which will be terrible for the person concerned and those closest, but also weakening the reputation of the builder, shipowner and those who have an interest in the project, also called stakeholders.

PMI (2013) defines project stakeholders as:

"Individuals, groups, or organizations who may affect, be affected by or perceive themselves to be affected by a decision, activity, or outcome of a project. They are comprised of persons and organizations such as customers, sponsors, the performing organization, and the public who are actively involved in the project, or whose interests may be positively or negatively affected by the execution or completion of the project*"*

Outside the shipowner and the shipyard, there are many stakeholders in a shipbuilding project. The figure below lists present some stakeholders in such projects:

- Government Institutions
- Local Authorities
- Classification Societies
- Financing
- Insurance
- Suppliers / Sub-contractors
- Workforce unions
- Flag State (during construction)

2.1.4 Conversion projects

The profitability of sea transport relies on adapting the functional properties of the ship to the operation in given sea navigation and market conditions. The functional adaptation of the ship consists in the appropriate choice of both its function type and technical parameters, which can be done either by building a new ship with the necessary characteristics or purchasing an existing ship that satisfies the specified requirements or by initiating an appropriate conversion a vessel. Often, such conversion is adequate of satisfying given requirements to a sufficient degree and it generally represents the cheapest solution (Michalski, 2017). The decision on the suitability of the vessel's conversion may lead to the necessity to increase the following ship parameters:

- Ship deadweight
- Ship speed
- Capacity of ship holds or cargo tanks
- Number of shipped containers
- Length of cargo trails
- Under-deck space volume

Spar (2004) highlights the fact that the most expensive lessons learned by both shipping companies and shipyards arise when they venture into territory that is new to them or tries to greatly accelerate traditional activities. In many cases, this results in significant cost and schedule overruns which are predictable results of contracting decisions based on hopeful outcomes rather than being based on a thorough analysis of capabilities, experience, and risks. Major conversions and projects relying on a bundle of what is known as owner-furnished equipment (OFE), may perhaps represent the two highest risk types of projects for both shipping companies and shipyards. The reason for this is due to the fact that the starting point for a conversion project is oftentimes ill-defined, even if the end-point is well-defined, except in cases where the shipowner introduces many changes during the conversion project. The greatest risks associated with OFE are system integration that involves products from several suppliers.

Further coverage of conversion projects goes beyond the scope of this thesis. The author acknowledges that in the case of conversion projects, which is a high-risk project, both the content of the contract and the technical specification of the work to be performed, are of great importance.

2.2 Risk Management

The risk management concept is widely covered through various project management literature. The field of risk management has grown considerably over the last decade (Mantel, Meredith, Shafer & Sutton, 2001). PMI (2004) defines risk management as; the systematic process of identifying, analyzing, and responding to project risk and consist of six sub-processes, shown in table 2.

Meredith & Mantel (2012) introduces a **seventh** sub-process to PMI's six sub-processes, the risk management register. This subprocess enables the creation of a permanent register of identified risks, a method used to mitigate or resolve them, and the results of all risk management activities. Meredith & Mantel argues that without this last step, both risk identification and analysis are useless. PMI (2004) risk management's six sub-processes with the additional seventh sub-process are presented here:

Sub-process	Description
1. Risk Management Planning	Deciding how to approach and plan risk management activities for a project
2. Risk Identification	Determining which risks might affect the project and documenting their characteristics
3. Qualitative Risk Analysis	Performing a qualitative analysis of risks and conditions to prioritize their impacts on project objectives
4. Quantitative Risk Analysis	Estimating the probability and consequences of risks and hence the implications for project objectives
5. Risk Response Planning	Developing procedures and techniques to *enhance* opportunities and *reduce* threats to the project's objectives
6. Risk Monitoring and Control	Monitoring residual risk reduction plans, and evaluating their effectiveness throughout the project life cycle.

7. Risk Management Register	A database containing risk information created and available for the project managers.

Table 2. (Meredith & Mantel, 2012)

An organization set out to work on a given project will before applying risk management procedures, produce a risk management plan. The benefit of producing such a plan at the start of the project is that it sets out both the strategic requirements for risk assessment and the whole risk management procedure (Lester, 2017). The risk management plan will specify:

- Type
- Frequency of reports
- The definition of the impact and probability criteria in qualitative and/or quantitative terms covering cost, time and quality/performance
- Content
- The roles of risk owners

One key element is the roles of risk owners. Liabilities and responsibilities of each contracting party are assigned through the conditions of the contract. What often generates avoidable claims and disputes is inappropriate and unclear risk allocation amid the contracting parties (Rahman & Kumaraswamy, 2002).

2.2.1 Risks in shipbuilding and tools to handle these

PMI (2013) defines project risk as; “an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives such as scope, schedule, cost, and quality. A risk may have one or more causes, and if it occurs, it may have one or more impacts”. A somewhat contradict to PMI’s definition of risk is the view of distinguishing between risk and uncertainty. Rolstadås et.al (2014) argues that uncertainty to the outcome of a planned event and which can be expressed with a probability, that is to say, a measure of a range of likely values. Risk, on the other hand, is a potential event that has both a probability and an impact. Risk is further defined as the probability of an event multiplied by its consequences (impact).

Rolstadås & Johansen (2008) differentiate between *operational, strategic and contextual* risk. Operational risk can be controlled by the project team and is connected to the project’s internal circumstances, for example, follow the plans (ship drawings). Strategic risk which is beyond the control of the project team, but may be handled by the project owner or sponsor, is a function of the compatibility between an organization’s strategic goals, business strategies, resources and the quality of the implementation of decisions. A C/O from the original scope, to meet changed business strategy may be a strategic risk. Competing projects, changes in ownership and management or other circumstances outside the project that may influence the scope of work and performance of the organization is categorized as a contextual risk. A yard going bankrupt is an example of this.

Lester (2017) split risks that in general have to be assessed into four main areas:

Project Risks			
Organizational	**Environment**	**Technical**	**Financial**
Management Resources Planning Labour Health and Safety Claims Policy	Legislation Political Pressure groups Local customs Weather Emission Security	Technology Contracts Design Manufacture Construction Commissioning Testing	Financing Exchange rates Escalation Financial stability of (a) Project (b) Client (c) Suppliers

Table 3 (Lester, 2017, p.75)

Matei & Chirita (2012) carried out a case study, applying an analysis model of operational risks within Damen Group Shipyards. In order to understand what types of risks are present in a shipbuilding project, the seven subcategories below are introduced in Table 4 on the next page seen from the shipyard's perspective.

Client	Contract	Financial
Financial stability	Contractual separation concerning the execution of agreed works	Payment terms
Country/area stability	Construction licenses	Cash-flow financing
Interpretation of contracts	Establishing penalties regarding contract forfeiture	Errors in cost distribution
Price settling methods: base/inflation/escalation price	Arbitrage conventions between the two parties	Work productivity estimation risk
	Obligations	Tariff structure
Expectations regarding the quality of the provided work		Insurance/warranties
Regulations on imports-exports		Base price/escalation method
Culture, communication, manufacturer beneficiary relationships		Foreign rate exchange differences
		Other

Technical	Producer	Internal
Organization and general performance	Country/area stability	Efficiency of production departments and departments indirectly related to production
Construction strategy/procedures for the hull and superstructure	Climate	Internal coordination and communication
Installing propulsion equipments	Facilities/Infrastructure/Know-how	Subcontractor management
Installing the electrical system	Efficiency	Quality of recorded/reported data
Installing other systems	Technology transfer	Quality control
Interior and furnishing	Culture	Internal procedures
Following plans (drawings)	Work conditions	Completion schedule
Installing management/warning systems	Taxes and legislation	Information relevance
Installing navigation systems	Security	Information exchange with the client
Installing communication systems	Worker safety and environmental protection	Others
Preparing the production documentation		
Performance of workers	**Suppliers**	
Maintenance of production equipments	Electrical equipments/services suppliers	
Supply of spare parts	Sanitary ventilation equipments/services suppliers	
Production monitoring and analysis degree	Interior and furnishing equipments	
	Paint jobs service suppliers	
	Equipment delivery terms	
	Contractual terms for eventual errors	
	Design services suppliers	

Table 4 (Matei & Chirita, 2012)

This illustrates the magnitude of the number of potential operational risks in a shipbuilding process, the need for tools to manage these are thus strong. The project management literature offers a great number of tools and techniques to categorize and evaluate each potential risk. Within qualitative risk analysis, the primary focus is to determine which risks are significant and which are insignificant. The most common three qualitative techniques are;

Qualitative risk analysis	**Method**
Red-light / Green-light rating	A subjective assessment of each project risk, highlighting those risks with the highest probability to occur and most significant impact in the red sector. The yellow light rating indicates a moderate level, green risks considered insignificant.
Urgency assessment	Approaching risks in terms of analyzing at which point a given risk should be addressed and managed.
Risk assessment matrix	The use of a risk impact matrix provides the stakeholders with an overview of the truly significant risks that must be prioritized. Ranked in terms of consequence, likelihood, and impact potential.

Table 5. (Rolstadås et al., 2014)

Occasionally, a quantitative risk analysis is conducted after the qualitative risk analysis has identified the critical risks within a project. Provided that data is available, quantitative methods are more precise and typically more accurate (Meredith & Mantel, 2012).

Five quantitative risk analysis techniques introduced:

Quantitative risk analysis	Method
Risk sensitivity analysis	A risk assessment tool which can give an indication of what the risk event impact would be on e.g. project cost or schedule based on a "what-if" numerical measurement.
Failure Mode Effects Analysis (FMEA)	A method for analyzing the technical or quality risks within a project. It can help to identify potential failure modes, evaluate what the effect of that will be on the product operation, and provide options to mitigate the risk of product failure. Preferably conducted during the early stages.
Expected Monetary Value (EMV) Analysis	An analytical technique determining the average monetary value of all potential combinations of a given project's decision and risk events, where probability values are added to these events, reflecting their uncertain nature.
Risk simulation	This technique determines possible impacts on a project by running "what-if" scenarios by the use of computer programs. A well-known method is the Monte Carlo simulation which allows the project manager to run potential risk conditions to see the most probable outcome of each risk event.
Analytic Hierarchy Process (AHP)	AHP is a multi-criteria decision method that enables the decision maker to define the issue in a logical and rational manner.

Table 6. (Rolstadås et al., (2014)

When it comes to risk response planning to *reduce* threats for the objectives of the project, there are different strategies provided from the risk management literature. PMI (2013) points out four particular strategies for dealing with **negative** threats, each having a varied and unique influence on the risk condition.

Risk response strategies	**Method**
Avoid	A strategy whereby the project team acts to eliminate the threat or protect the project from its impact by e.g. extension of schedule, change of strategy, reduced scope, or shut down the project entirely
Transfer	A strategy by which the project team shifts the impact of a threat to a third party, together with ownership of the response. Very common in shipbuilding, where the transfer of risk is done through the contract.
Mitigate	An approach through which the project team acts to reduce the probability of occurrence or impact of a risk. Examples of mitigations could be choosing stable suppliers, run more tests, adopting less complex processes.
Accept	A strategy, either passive or active, whereby the project team chooses to acknowledge the risk and not take any actions except if the risk occurs. A passive approach would be to document the strategy without taking any actions. An active approach is to establish a contingency reserve.

Table 7. (PMI, 2013)

In order to capitalize on **positive** risks which provides opportunities on the project objectives, PMI (2013) suggests four different strategies to *enhance* these potential opportunities.

Risk response strategies	**Method**
Exploit	A strategy where the organization desire to ensure that the opportunity is realized. Actions such as hiring the most talented resources, use new or upgraded technology to reduce cost and duration are examples of exploit responses.
Enhance	An approach which by the project team use to increase the probability and/or positive impacts of an opportunity, as for an example adding more resources to finish early.
Share	A strategy where one allocates some or all the ownership of the opportunity to a third party which is best capable to seize the opportunity for the benefit of the project. Example of this is JRM.
Accept	An approach where a project team accepts an opportunity and is willing to take advantage of it, but don't actively pursue it.

Table 8. (PMI, 2013)

Even though some of these risk response strategies are designed for use only if certain events occur, some also give a foundation for more jointly strategy in handling risks. A project team will regardless benefit of making a response plan executed under certain predefined conditions. Missing intermediate milestones such as steel cutting or keel laying, which both might be events that trigger the contingency response, should both be defined and tracked.

2.3 Joint Risk Management

The definition of *Joint Risk Management* (JRM) used in this thesis is derived from Osipova & Eriksson (2012) research paper on implementation of JRM in two construction projects and is as follows;

Joint risk management is about the dynamic management of risk. A dynamic approach implies that the identification and assessment of project risk, along with the response to it, are performed proactively and jointly throughout the project between the parties involved.

The definition highlights risk management and collaboration throughout the project lifecycle. Osipova & Eriksson (2012) investigated how mechanistic (control-oriented) and organic (flexibility-oriented) management systems influence the implementation of such risk management approach within onshore construction projects. Their results are quite interesting as they found that when a manager achieves a balance between control and flexibility, it provides the foundation for successful JRM. Whereas, when a manager uses control as a main risk management tactic, JRM is hard to achieve as it requires flexibility. In a shipbuilding project, the scope of the project might vary from building a coastal oil tanker to a cruise ship. Complexity, uncertainty, and procurement procedures are different from a standard oil tanker in comparison with a complex offshore vessel. Thus, the degree of being flexible oriented in management will have different challenges for each project.

Rahman & Kumaraswamy (2002) argues that in order to achieve successful project delivery, the project depends on the attitudes of the contracting parties and cooperative relationships between project participants. The nature of each project dictates which appropriate contracting methods and contract documents should be used for the project. However, even with an appropriate contracting method with coherent and unbiased contract documents do not by itself provide project success where project teams working together in the face of uncertainty and complexity with diverse interests and conflicting agendas. In their case study and survey inside the construction sector, Rahman & Kumaraswamy (2002) found that relational contracting may reduce transaction costs, generate cooperative relationship and teamwork that in turn facilitate JRM. Relational contracting can be seen as a contractual approach recognizing mutual benefits and win-win scenarios through a greater cooperative climate between the parties involved in the project. This will later be discussed under subchapter ***2.3.1.***

Doloi (2009) found that the success of relational partnering can only be reached if all key stakeholders interact in clear lines of communication across all levels. If so, effective communication evidently creates a foundation to develop trust and confidence between the parties involved in the project, thus building collaborative risk management capability for the project. Leufkens & Noorderhaven (2011) carried out an empirical study of multi-organizational projects in the Dutch shipbuilding industry. They aimed to identify both at the organizational and the project level, the relationships between social constructions of interests and the capability to learn to collaborate more effectively. Through data collection, the researchers found a pattern of perceived interests that would make a shift to "integrated collaboration" problematic. Another finding suggested an overall interest with such an approach, justified by the fact that it may be necessary to preserve shipbuilding in the Netherlands. Leufkens & Noorderhaven (2011) further calls upon the need for a new definition of the strategic roles and even identities for both the shipyards and the suppliers, to be able to openly share knowledge and share the risks of the project at a preferably early selection and involvement of key players.

Given the nature of a project, a temporary organization, the focus on short-term gains rather than long-term collective gains for all involved organizations jointly, is a pivotal concern within multi-organizational projects. In a shipbuilding project where a number of organizations may be involved, the possibility of clashing interest between the parties is important to discuss. Every organization participating in such project is an independent company with its own goals, which highlights the fact that each company involved has its own interest, in addition to its own perspective on the interests of each other. This introduces the *post-contractual opportunism.* This is a phenomenon that may occur after the contract is signed, also called moral or covert action. In such a scenario, either the contractor or supplier reduce their costs or seek increased profitability at the client's expense. An example of this can be using unskilled workers at the shipyard which the shipyard fails to mention by behaving opportunistically. This behavior is often encouraged when elements such as a strong emphasis on tenders and price-based competition in combination with decreasing markets are present (Aarseth et al., 2016). All which shipbuilding represent. In order to pursue individual or organizational interests, individuals within the organizations are driven by the account of their actions. In the interest of collaboration, the organizations involved in a multi-

organizational project has to overcome their conflicting interests and focus on their common interests which are centered on the project goals (Leufkens & Noorderhaven, 2011).

2.3.1 Integrated Project Delivery

Shipbuilding construction shares some properties with construction projects on-land. Therefore, the Integrated Project Delivery, which is a newly developed project approach, that in particular shares risks among project participants in on-shore construction, is used as an analogy to shipbuilding. Integrated project delivery (IPD) is a form of a relational contract agreement. This type of project approach has in recent years been implemented to meet a more complex and specialized project everyday life which project teams face today (Kahvandi, Saghatforoush, Alinezhad & Noghli, 2017). The American Institute of Architects (AIA) defines IPD as;

"*A project delivery approach that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, reduce waste and maximize efficiency through all phases of design, fabrication, and construction*". (AIA, 2007).

Table 9 illustrates the differences between two contrasting project approaches for on-land based construction.

Traditional Project Delivery		**Integrated Project Delivery**
Fragmented, assembled on "just-as-needed" or "minimum-necessary" basis, strongly hierarchical, controlled	**Teams**	An integrated team entity composed key project stakeholders, assembled early in the process, open, collaborative
Linear, distinct, segregated; knowledge gathered "just-as-needed; information hoarded; silos of knowledge and expertise	**Process**	Concurrent and multi-level; early contributions of knowledge and expertise; information openly shared; stakeholder trust and respect

Individually managed, transferred to the greatest extent possible	**Risk**	Collectively managed, appropriately shared
Individually pursued; minimum effort for maximum return; (usually) first-cost based	**Compensation/ Reward**	Team success tied to project success; value-based
Paper-based, 2 dimensional; analog	**Communications / Technology**	Digitally based, virtual; Building Information Modeling (3, 4 and 5 dimensional)
Encourage unilateral effort; allocate and transfer risk; no sharing	**Agreements**	Encourage, foster, promote and support multi-lateral open sharing and collaboration; risk sharing

Table 9. (AIA, 2007, p.6.)

IPD is built on collaboration, which in turn is built on trust. Rather than each parties having a focus on their own individual goals, trust-based effectively structured collaboration encourages parties to focus on the project outcome. Although IPD promises better outcomes, it does not come without some changes. This approach requires the project members to follow nine general principles;

Principle	Description
Mutual respect and trust	IPD requires commitment from all participants to work as a team and a common understanding of the value of collaboration
Mutual benefit and reward	The compensation structure is set up to reward early involvement, value added by a participant and "what's best for the project behavior.

Collaborative innovation and decision making	Facilitate an environment in which the free exchange of ideas is evaluated based on the benefits it provides, which are considered and decided as unanimously as practicable
Early involvement of key stakeholders	Decisions have the greatest effect in the early stages of the project. Thus, it is essential to capture the key stakeholders' knowledge and expertise at the initial stage.
Early goal definition	All participants agree and respect the project goals developed early.
Intensified planning	An increased effort in planning is the basis to achieve greater efficiency and savings during execution.
Open communication	One essential part of IPD. Team performance is based on open, direct, and honest dialog among all participants. No-blame culture as responsibility is clearly defined, focusing on identification and solution-oriented rather than measuring liability. If any disputes occur, those are accepted and promptly resolved.
Appropriate technology	Disciplined and transparent data structures are essential to support IPD through open and interoperable data exchanges.
Organization and leadership	Defined and clear roles are required and management is taken by the team member who is best able to perform specific tasks and services. All with a common understanding of the project group's goals and values without creating artificial barriers that discourage open communication and risk-taking.

Table 10. (AIA, 2007)

Mutual respect and trust is the single most important principle of IPD (AIA 2007). Trust is gained through relationships and commitment; when this kind of trust is present, an individual accepts risks knowing that the intention of others is mutually positive (Martin and Songer 2004). Kahvandi et al. (2017) researched the trend of studies in the field of IPD, in a total of 156 articles. Through evaluation of these, some of the benefits uncovered by implementing IPD includes reduced C/O's and a lower degree of financial and contract problems. If early participation of key project stakeholders took place, reduced completion time and more cost-savings were feasible. The researchers stress the importance of having sufficient IT technology when implementing IPD, as online communication with adequate software reduces changes and duplications, thus create major savings in project cost and time.

IPD provides positive value propositions for the two major stakeholders of interest: Shipowner and Shipyard.

Shipowner

In order to meet the business case goals, the IPD approach will through early and open sharing of project knowledge allow the shipowner to effectively balance project options. The reason for this is because the approach enhances the project team's overall understanding of the desired outcome, which enables the assigned project team to control cost and managed budget. In return, the shipowner is more likely to achieve success on project goals, schedule, life-cycle costs, quality, and sustainability. Admittedly, it does not come without an increased presence. In such an approach, the shipowner has to take on an extensively larger and more active role in both evaluating and influencing the design options. Unlike traditional projects, the shipowner is required to take part in establishing project metrics at an earlier stage. In addition, increased assistance towards finding solutions to issues that arise in the project, involvement in project-related specifics and compulsory to act quickly to allow fluid and efficient project (AIA, 2007).

Shipyards

If one were to evaluate what contribution the shipyard will provide in such project approach towards enhancing the likelihood of reaching project goals, schedule, life-cycle costs, quality, and sustainability, there are several aspects. Firstly, by early contribute with their expertise in ship construction techniques during the design stage, both project quality and financial performance during the construction stage is likely to be improved. Secondly, it provides the opportunity to do clear pre-construction planning, gain a better understanding of the design to be constructed, earlier analysis or identification of risks attached to the design, as well as improving cost control and budget management prior the construction. The shipbuilder will also be required to adjust his normal contribution by participating and at an earlier stage in the integrated team, as well as other factors. Firstly, an increased role will be required by the ship's builder during the aforementioned design phase, during which the yard through this project approach, provides strategic services such as schedule production, cost estimates, system evaluation, construction assessments, and procurement programs significantly earlier than traditional projects. The benefit of involving the yard early in the project phase is the accompanying expertise and participation that allows them to comment and influence design. The shipyard will then be obliged to provide continuous estimation services during the design phase (AIA, 2007).

If one were to choose an IPD approach, the primary project participants need to be obliged through a single contract, also called a multi-party agreement (MPA), in order to specify each ones' respective roles, rights, obligations, and liabilities. Within MPA, there are three general forms, *Project Alliances, Relational Contracts,* and *Single Purpose Entities*, which in itself creates temporary organizations aiming to realize a specific project. Project Alliance was first developed to uphold oil exploration in the North Sea. In order to face the challenges those explorations presented, there was a need for a new project structure. In the case of this thesis, offshore field development is not covered. Literature considering JRM is primarily linked to Relational Contracts, therefore only this multi-party agreement is further elaborated.

Relational Contracts

What distinguishes Relational Contracts from Project Alliances is the compensation model, risk sharing and decision-making. Liability may be limited to each other, although not completely waived. There is a measure of traditional accountability if errors occur, to were conventional insurance is expected to respond. In terms of the compensation structure for Relational Contracts, it still is project-based incentives even though project overruns may or may not be collectively accountable. The owner in a Relational Contract maintains the final decision if the team fails to agree, but decisions are normally discussed and resolved by consensus at the team level. One might argue that Relational Contracts is somewhat similar to traditional project structures in terms of the balance of accountability, risk, and control. Thus, this form of multi-party agreement may suit certain projects and stakeholders better, relative to the unique risk profile the project contains. The basic approach in terms of compensation is the use of direct cost, a fixed and negotiated sum for overhead and profit, and a variable performance-based bonus for each stakeholder. AIA (2007) advises using criteria such as schedule, quality, and performance instead of individual goals when measuring project success that the bonus is tied to.

Whether if the compensation method includes a guaranteed maximum price for either the project or scope of work, is to be determined by the stakeholders involved. Normally the project contingency is an overall contingency, which excludes the scenario where each stakeholder includes its own contingency in its individual contract amounts, due to the possibility of improperly high contingency are submitted to reduce their own risk. This scenario is only likely when guaranteed maximum prices are present. Under relational contracts, the owner bears the ultimate risk that the project does not meet financial or performance goals. This risk may be mitigated, to the extent that a guaranteed maximum price has been established, a profit participation agreement is reached, or possible recoveries against participants for negligence or breach of their contracts is pursued. The participants also risk the variable portion of their compensation, such as a bonus opportunity or innovation fund. Another contradiction to Project Alliance is that in a Relational Contract each party is responsible for its own errors and omissions (AIA, 2007).

3. Methodology

Frankfort-Nachmias, Nachmias, & DeWaard (2015) argues that the ultimate goal of social sciences together with all other sciences is to produce a cumulative body of verifiable knowledge. Aforesaid knowledge enables us to explain, predict, and understand the empirical phenomena of interest to us. This chapter covers the research methodology applied to answer the research question in this study. According to Frankfort-Nachmias et al. (2015) the research process consists of seven fundamental stages: problem definition, hypothesis construction, research design, measurement, data collection, data analysis, and generalization. Each stage influences the development of theory and is influenced by it in turn. The five latter fundamental stages are described throughout this chapter.

3.1. Research strategy

A research strategy requires an overview of the whole study, a carefully constructed plan of action that is rationally designed, and a specific goal that can be achieved and which is clearly identified. A research strategy differs from a research method, as the latter entails the tools for data collection. The research strategy and methodology tend to be interlinked, as for example the use of qualitative strategy is often linked with the use of interview as the method for data collection (Denscombe, 2010). There are two different main research methods, quantitative and qualitative. Bryman (2016) introduce quantitative research as a research strategy that emphasizes quantification in the collection and analysis of data. Further, quantitative research entails a deductive approach between theory and research, incorporated practices and norms of the natural scientific model and of positivism, in addition, to embody a view of social reality as an external objective reality.

Qualitative research, on the other hand, Bryman (2016) argues is a research strategy which usually emphasizes words rather than quantification in the collection and analysis of data. Further contrast to quantitative research, qualitative research approach emphasizes on an inductive approach between theory and research, in which priority is placed on the generation of theories instead of testing theories. Qualitative research strategy rejects the practices and norms of the natural scientific model, positivism in particular, in desire for attention on how individuals interpret their social world. It also includes a view of social reality as a constantly shifting emergent property of individuals creation. Bryman (2016) points out that qualitative

research is not necessarily limited to solely generate theory, but could be used to test theories or at least shed light on them. Bryman (2016) highlights the fundamental differences between quantitative and qualitative research strategies as follows:

	Quantitative	**Qualitative**
Principal orientation to the role of theory in relation to research	Deductive: testing of theory	Inductive: generation of theory
Epistemological orientation	Natural science model, in particular positivism	Interpretivism
Ontological orientation	Objectivism	Constructionism

Table 11. (Bryman, 2016, p.32)

Hennink, Hutter & Bailey (2012) simplifies the dissimilarities and provides a table with the key differences between qualitative and quantitative research:

	Qualitative research	Quantitative research
Objective	To gain a detailed understanding of underlying reasons, beliefs, motivations	To quantify data and extrapolate results to a broader population
Purpose	To understand why? How? What is the process? What are the influences or context?	To measure, count, quantify a problem. How much? How often? Relationships in data
Data	Data or words	Data are numbers or numerical data
Study population	Small number of participants or interviewees, selected purposively (non-randomly)	Large sample size of representative cases
Data collection methods	In-depth interviews, observation, group discussions	Population surveys, opinion polls, exit interviews
Analysis	Analysis is interpretive	Analysis is statistical
Outcome	To develop an initial understanding to identify and explain behavior, beliefs or actions	To identify prevalence, averages, and patterns in data. To generalize to a broader population.

Table 12 (Hennink et al., 2012, p.16)

In summary, qualitative research seeks to achieve through the depth of information, rather than breadth, to understand or explain behavior and beliefs, identify processes in the context of people's experiences. On the other hand, quantitative research aims to generalize findings to the broader population by quantifying a research problem, measure and rate the effect (Hennink et al., 2012). This thesis's objective is to research high-ranked employees within the shipbuilding and on-land construction projects to gain an understanding of their motivations in risk management. The purpose is to understand how they interpret and practice their risk management routines, and if there might be any benefits of doing such routines in collaboration with the other contract party. Therefore, to achieve an in-depth understanding of the research topic, the data is textual of a small number of interviewees, selected purposively. An inductive view of the relationship between theory and research is used, whereby the

theory is generated out of the research. This, to develop an initial understanding of the research topic. Therefore, the qualitative research strategy is the best fit and chosen strategy.

3.2 Research Design

Bryman & Bell (2011) introduce research design as a key concept which provides a framework for the collection and analysis of data. Research design is influenced by the research approach and reflects the priority being given to a range of dimensions of the research process. There are five different research designs: classic experimental; cross-sectional; longitudinal; case study; comparative (Bryman & Bell, 2011). The experimental design is typically applied to quantitative research comparisons between experimental and control groups with regard to the dependent variable. The cross-sectional design usually consists of a random sample and are broadly used to identify causal relationships between variables. Longitudinal research design may survey a sample multiple times. A case study design is used where the researcher studies the complexity and particular nature of the case in question. Comparative design, on the other hand, entails that the study carried out is using more or less identical methods of two or more contrasting cases.

As the research topic for this thesis is little or not previously researched, an exploratory stance is favorable, therefore the research design for this thesis is exploratory qualitative design. “Qualitative research projects are described as exploratory when they examine an issue for the first time, in-depth, within a given setting, context, or with particular types of participants” (Given, 2016, p.57). The approach to this thesis is the generation of theory, hence inductive. Contradictory to a deductive approach which examines relationships between variables, inductive approach examines relationships among entities. These entities can be people, a group or a company. Through theoretical generalization, the aim is to identify possible benefits of JRM between owner and builder in a complex newbuilding or conversion project, therefore examines relationships among entities and the participant's points of view. Explorative research, also commonly referred to as grounded theory is an approach dedicated to generating theories. The emphasis is to link any explanations very close to what happens in practical situations in “the real world” through empirical fieldwork. When the researcher wants to investigate practical activity and routine situations, the exploratory research approach is convenient (Denscombe, 2010). Therefore it also supports the aim in

researching how active the risk management routines and procedures of today's shipbuilding is carried out.

3.3 Data Collection

Qualitative data is considered with features such as richness and holism, in addition to strong potential for revealing the complexity that provides data with thick descriptions (Miles, Huberman, & Saldana, 2014). Hennink et al. (2012) define an in-depth interview as a one-to-one method of data collection that involves both the interviewer and interviewee discussing specific topics in depth. This research data collection method provides three different types of interviews: structured, semi-structured, and unstructured. To understand and provide data on mechanisms and processes related to risk management within the shipbuilding projects the data collection is generated through in-depth semi-structured interviews. One of the main attributes with semi-structured interviews is that although there is a list of prepared questions related to the specific topics to be covered, the informant has a great deal of leeway on how to reply. This is because you open up for questions and answers outside the pre-encrypted interview guide, and there is more emphasis on the informant elaborating points of interest (Brymann 2016). Considering my approach is explorative, this data collection method fits neatly.

Although Denscombe (2010) highlights the fact that there is not a particular method of data collection that is claimed to be unique to grounded theory, there is known to be a preference for unstructured interviews rather than structured which produce qualitative data. As the author has preconceived ideas about the critical issues related to JRM, the interview structure is somewhat more semi-structured rather than unstructured. But, by and large, all the questions were asked and a similar wording was used in six out of seven interviews. The exception was due to an interview with an informant from another industry than the maritime domain, where the maritime aspect was substituted with on-land terminology. The emphasis must be on how the interviewee frames and understands issues and events - that is, what the interviewee views as important in explaining and understanding events, patterns, and forms of behavior (Bryman & Bell, 2011). Creswell & Poth (2018) illustrates in figure 3 on the next page, in a great way how the data collection process was carried out for this thesis.

Figure 3: (Creswell & Poth, 2018, p.166)

3.3.1 Interview guide

"The idea of an interview guide is much less specific than the notion of a structured interview schedule. The term typically refers to a list of issues to be addressed or questions to be asked in semi-structured interviewing. What is crucial is that the questioning allows interviewers to glean research participants perspectives on their social world and that there is flexibility in the conduct of the interviews" (Bryman, 2016, p.469). Both interview guides (only one attached as an appendix) were arranged in the same order, consisting of an introduction, two main parts, and final questions. Firstly, four introduction questions which covered professional background, company position, and experiences in shipbuilding/ on-land construction projects. Secondly, the main part (1) included eight main questions with sub-questions for five of those questions. This sectioned covered risk management in general and conversion projects. At the completion of the main part (1), the informants were handed over the definition of JRM. Thirdly, the main part (2) which covered JRM, in particular, consisted of six main questions in total, whereas four of them had sub-questions. Fourthly, final questions enabling for any corrections and additions. Two additional questions were used if there was any time left. Kvale (1996) suggests there are nine different kinds of questions one can ask. The questions introduced to the informants was a combination of six various kinds: introducing, follow-up, probing, direct, structured, and interpreting. Test of the interview guide was conducted with two fellow students, and only slightly adjusted before the interviews, in collaboration with this thesis supervisor.

3.3.2 Population

A population is the set of all units about which the researcher wants to draw conclusions (Frankfort-Nachmias et al., 2015). The population for this thesis is professionals within both the maritime and on-land construction sector in Norway, in 2019.

3.3.3. Sample

Within modern sampling theory, there is a basic distinction made between probability and non-probability sampling. What characterizes a probability sample is by the ability to specify the probability at which each sampling unit of the chosen population will be included in the sample. Contrary, in a nonprobability sample, there is not by any means a way of specifying the probability of each unit's inclusion in the sample, as well as there is no

assurance that every unit has some chance of being included (Frankfort-Nachmias et al., 2015). With data collection through interviews, this is usually conducted with fewer informants in comparison with quantitative questionnaire surveys, explaining why the selection of informants for interviews is more likely to be based on non-probability sampling. Researchers who use interviews for data collection, therefore, tend to choose in a deliberate way because the informant might have some special contribution to the research, have unique insight or because of the position they hold (Denscombe, 2010).

Furthermore, the sampling criteria for this thesis are professionals who work on shipbuilding projects, both on the builder side as well as at the buyers, in addition to on-shore construction professionals with experience within handling IPD-contracts. A convenience sample, which is one of the four major designs utilizing nonprobability samples, was chosen because of the challenges of recruiting informants. However, it was a criterion that the informant participating had project experience in shipbuilding or construction projects, therefore the sampling became a combination between convenience and purposive sampling. In total, participation requests were sent to twenty-two different companies. Out of these, eight responded positive, which of one organization withdrew without any reasoning of why. That gives a hit rate of 36 percent. All requests were sent directly to the companies public contact email. Although within the interview request email it was stated that it would be optimal with informants having experience in shipbuilding or IPL-contracting, the author had no influence in who was recruited internally from each organization. Six out of seven was face-to-face interviews at each informant's corporate office, the last interview was conducted through Skype due to limited time and travel budget. In one interview, the organization was represented by two informants. Due to the fact that one of them did not attend for a large amount of the interview, not received the consent form prior to the interview and did not sign the consent form, data gathered from this informant was not analyzed.

Table 12 illustrates the final participants for the thesis. By cause of anonymity, some interviewees have been given generic titles.

Interviewees	**Representing**	**Shipbuilding projects participated in**
Quality Manager - **A**	Yard	70-100
Vice President Projects - **B**	Shipowner	8-10
Project Director - **C**	Shipowner	10
Director New-Building - **D**	Shipowner	16
Vice President Projects - **E**	Shipowner	7-8
Technical Manager - **F**	Yard	10
Advisor - **G**	On-land construction / IPL-contracts	N/A

Table 13. Informants

3.4 Ethical issues

"The sole objective of research is to contribute to the development of systematic, verifiable knowledge. The research process provides an overall framework for the activities that enable scientists to produce such knowledge. In practice, however, each stage of the research process may involve ethical considerations that stand in the way of conducting purely scientific research" (Frankfort-Nachmias et al., 2015, p.65.).

There are certain challenges in relation to ethical principles that are both discussed and possibly breached in research that repeats itself to varying degrees. Bryman and Bell (2011) describe four of them; whether there is an invasion of privacy; whether there is a lack of

informed consent; whether deception is involved; and whether there is harm to participants. Thus to ensure following these four ethical principles a participating consent form provided by the Norwegian Centre for Research Data (NSD) was sent out to each recruited participant in beforehand of each interview. The consent form included information about the purpose of the research, description, what does it entail to participate, privacy and rights, anonymity and references. Given that there is seven different organization involved in this research, an important aspect is keeping anonymity through data collection and when results are drawn. This is to safeguard each informant's background and their employer and reduce the risk of being involved in the research project. The degree of information provided through the consented scheme was carefully considered, not to disclose too much of the JRM phenomenon. As an example, the definition of JRM was not presented in the consent form to avoid various pre-covered answers. Duplicate presentation of the phenomenon gives a greater degree of natural answers from each informant.

Both names of informants, companies, and language of the interviews have been carried out on is held anonymous.

3.5 Data analysis

The idea of analyzing data is to get a better understanding of the data. The analysis unit differs between quantitative (*numbers*) and qualitative (*words* or *visual images*) research, and thus there are various challenges for the two mentioned methods when analyzing the data (Denscombe, 2010). “One of the main difficulties with qualitative research is that it very rapidly generates a large, cumbersome database because of its reliance on prose in the form of such media as field notes, interview transcripts, or documents” (Bryman & Bell, 2011, p.571). Data collection for this thesis were gathered through seven semi-structured interviews, thus providing a large amount of data. Unlike quantitative data, there is to less degree established any codification of analytic procedures for qualitative data. Denscombe (2010) lists five different types of analysis; content analysis, grounded theory, discourse analysis, conversation analysis, narrative analysis.

For the purpose of this study, an exploratory approach, the grounded theory analysis fits neatly. This type of analysis is primarily associated with the analysis of interview transcripts, although it exists exceptions. “The analysis requires a detailed scrutiny of the text and involves a gradual process of coding and categorizing the data. The ultimate goal of the

analysis is to derive concepts and theories that capture the meaning contained within the data" (Denscombe, 2010, p.283.). Seeking to use findings from particular instances as the basis for developing statements that apply at a general level connects the analysis to the inductive approach. The data analysis was conducted through eight different steps; exploring the data, creating memos, coding the data, categorize the codes, reduce the number of codes and categories, develop a hierarchy of codes and categories, checking the emerging codes, categories, and concepts with the data, which resulted in eleven key concepts. These key concepts (table 13.) is by the fact the main purpose of the analysis because they shall provide both some new insight and understanding of the data, along with providing the foundations for general conclusions to derive from the research (Denscombe, 2010).

All seven interviews were transcribed in its entirety, contributing to an overall better overview of available data from every single participant, which simplified the selection and coding of each topic discussed with each participant.

1. Project risk management and its value	5. Success in terms of risk management	9. Reluctance to share
2. Routines and processes for risk management	6. Conversion projects	10. Contract
3. Type of approach	7. Potential benefits with JRM	11. Digitalization
4. Most common risks	8. Potential challenges with JRM	

Table 14 – Key concepts

3.6 Reliability and Validity

Bryman & Bell (2011) distinguish between reliability and validity. Whereas reliability is concerned with the question of whether the results of a study are repeatable, validity encompasses the integrity of the conclusions that are generated from a piece of research. Denscombe (2010) highlights that with qualitative research, the researcher can as a result of being very close with the research instrument be an integral part of it, which will affect the reliability of the results. Whether the study can be replicated and achieve the same results is hard to define, as Bryman & Bell (2011) points out. Population, sample and how the data was

analyzed is presented in this chapter. All interviews were recorded, therefore what was said during the interviews is not up for subjective interpretation, and thus internal reliability is almost neglected. One interview recording failed in the form of poor sound quality on the informant. It was later discovered that the recording was conducted in interview-mode by mistake, while the six successful ones were done in meeting-mode. Thus, the interview was partly conducted through email post-interview. In a scale of great-good-bad, reliability is assumed to be good. In terms of validity, Denscombe (2010) points to three different methods to assure data validity: triangulation, respondent validation, and grounded data. The latter was used in this thesis. As previously mentioned six out of seven interviews was done on-location at the informants' workplace. The data collected were in detailed analyzed based on the empirical data gathered in the field. The same method was used for the empirical data collected by a Skype interview. According to Denscombe (2010), this is one of the main benefits of qualitative research as it provides a satisfying foundation to draw conclusions based on this empirical data and adds validity to the research. However, the sample size in this thesis is small (seven) and the shipowner/shipyard balance is not equal (4 versus 2). Bryman (2016) claim that small samples represent a problem for qualitative research in terms of validity (external). Therefore, with the same scale aforementioned (great-good-bad) the validity in this thesis is assumed to be good.

3.7 Limitations

Literature covering the phenomenon JRM is quite limited. There is only found to be discussed in on-land construction projects, close to nothing in the maritime domain. Therefore, the results and analysis are difficult to review in terms of previous research. Due to the limited literature on JRM in particular, an explorative approach was chosen. Given (2016) points out that some researchers mistakenly see exploratory qualitative as a process to design robust quantitative studies, and argues that the results will be valid if the sample is large enough. This thesis sample is limited to a relatively small sample of seven informants and only concerns Norwegian shipowners and shipyards regardless of which segment they belong to. Initially, an informant was recruited to represent the legal and contractual aspect of the shipbuilding process. This would enrich the contractual part of the thesis and may have identified any opportunities or challenges for shipbuilding contracts in relation to implementing JRM. However, as aforementioned, this informant withdrew without any explanation. Accordingly, the generalizability of the thesis may be regarded as weakened.

Bryman (2016) calls attention to that what is crucial when assessing generalization, is the quality of the theoretical inferences that are made out of the qualitative data.

Flick (2011) argues that all questions should be asked in the interview that is relevant to the issue. The interview guide works like a scope of this thesis, and therefore also as a limitation. Even though the semi-structured interview allows for questions outside what is pre-defined, two interviews were uneven in time used on main part 1 and 2, where main part 1 took the largest portion. This was a result of that the interviewer did not carry out adequate governance and tight schedules. Six out of seven interviews were face-to-face, which Jacobsen (2015) argues has a weak side too, as the interviewer effect is potentially strong. The order of the interview questions was not changed from interview to interview so that biased factors in the data collection cannot be ascertained as completely neglected. At the same time, one important point to emphasize is that the interviews were largely semi-structured, and therefore each question was not asked in the same order for natural reasons. However, this reduces the overall validity of the study. Reliability is also reduced due to one partly failed interview recording. Fortunately, the informant was kind enough to complete the interview through email correspondence. Some interviews were conducted in the native language and translated to English. Therefore, some data may have been misinterpreted or lost in the translation part.

4. Findings

All direct quotations are presented in its own paragraph with italic text.

4.1 Project risk management and its value

The first question in the first part of the interview, after some general background questions, were related to what project risk management meant for each informant and to what degree it is of importance in a project. Informant B differentiate between risk management and project management:

"Risk management is about quality, time and finances plus safety, whereas project management is usually a balance between cost, time and quality".

Informant A, on the other hand, combined these two, as well as highlighting the degree of importance:

"Risk-based project management is extremely important and it is about following the processes and routines you have, in order to identify risks, evaluate and take action against them".

While informant D recognizes risk management as something which is mostly at the yard's capacity, and the importance of having financial control, informant C differentiate between economic risk and technical risk:

"There are clearly different themes (economic and technical risk) and it is clear there are methods to collect and create total risk. For me it is most important to work with the risks and feel one has control over it but perhaps control in different ways and use different mechanisms".

Informant E describes risk as a method of defining the items that need to be controlled to have success for the project, and allocate these activities to stakeholders responsible for the risk attached to the items through an agreement between the parties. An environment and routines for reporting risks, thus safeguarding that nothing is swept under the blanket, which again establishes a common understanding that the sum of all items can generate huge consequences for the project is an important daily activity, informant F points out. Informant G, the only informant lacking experience within shipbuilding projects, also refer to risk management as absolutely crucial, but also mentions contract strategy:

"Managing risk both strategically on the choice of implementation and contract, but also during the actual implementation of the project, it is important to have both good processes, good methodology, work method during process and conducting continuous work in the risk management, so it is crucially important".

4.2 Routines and processes for risk management

What type of routines and processes each organization has, vary a lot between the informants. If one starts with the two yards that are participating in this thesis, the difference is quite significant. Although one of the yards are in a transition phase from the use of Excel sheets towards implementing a new tool which will systemize the risk management with the aim to gain good routines and processes, the second yard is quite far ahead in terms of integrated risk management. Although the second yard's digital system covers many other parts of a shipbuilding project such as sales, planning, and detail engineering among others, risk management is a part of it. The informant employed at the yard with the integrated management system (IMS), describes the benefits with this system such as providing clear clarifications, predefined job instructions, who will enter the project and who is responsible for what. With projects including new technology, the informant recognizes the limitations:

"So one should start already in a tender phase on sales right, by establishing a risk analysis where one breaks up a project in all possible segments based on the experience we have from previous projects. And that is what one is at the mercy here, because there is no tool that can tell us all the risks (...). But, you have tools that at least establish and start some processes that will help us map risk in a good way".

The same yard also has a clearly established and required routine for reporting internally:

"We have a separate document, project risk management, which is located there with various annexes and attachments on how to do this in the project, which is a support for the project managers. And, this is something we require in the line-management, reported monthly. Where it is to be revised, various criteria and status must be included in what is actually status under the various risks one has initiated early. So it is a tool that all project managers must use".

Both shipyards do not traditionally coordinate the risk analysis with its customers. From the shipping company side, a surprising finding was that one informant honestly admitted:

"We have no routines for risk management".

The informant further explained that this often is due to very experience and person-related in relation to who controls the projects, if it is carried out a sensible and organized risk management or not. Relating to an on-going project the same informant stated:

"In the process we are in now, a risk identification process was introduced, but it is probably not at the level of what the theory suggests that risk management must and should be".

All four informants representing the shipowner side pointed out meeting-based risk management as a routine or process. Informant E stated:

"The overall risk for the project is done by the project manager and presented to the board of directors".

This is in some way similar to what informant C expressed:

"I have every month a board committee meeting as we call it, but it's really a project risk management (…) but we call it a board committee meeting where I present the project, go through the status of the project to four people from four completely different disciplines in the company".

Informant D referred to their integrated management system, which is used in all aspects of the daily work being newbuildings, contracts, operations, and purchasing. Thus, informant D's take on risk management was naturally coherent with their set-up:

"Risk management during the project you can say is about being present and follow the procedures we have. We have procedures for everything, for all practical and theoretical tasks (…) no other formal routines than what is already inside the IMS".

4.3 Type of approach

All informants were asked if they had experienced different approach in relation to risk management and if parties involved in projects seeks collective interests or individual gains on behalf of their stake in the project. Four out of seven informants have experiences to great extent differences of how other parties involved in the same project, approach risk management. Shipyards outside northern Europe is characterized as shipyards without any very prominent risk-based management, along with large variance in-between each single shipyard, by informant A and D. Responsibility in terms of contractual matters, will reflect the risk management, according to informant E. This factor is also in a way supported by the experiences informant F has, representing one of the yards:

"You know, for me, risk management is that (...) or good management is having good control of the project. And having good control of the project is to have good control of the things that are within each phase. So that we have control over the design delivery, that we get all the drawings, that we quality assure against specification, against contract, against regulations, class (...) all this in a way is good risk management, but then one experiences that it is not all customers who are equally good at putting that mark on that process and then (...) it does not necessarily mean that there is little focus on risk management, not necessarily, but indirectly I think that it (...) then you have less focus on it".

Project-team composition and chemistry between the different parties may affect the approach, according to informant E:

"I've been to projects where we have just changed out some of the project management teams, and we have suddenly got a whole other good atmosphere within the progress of the (...) because some of them were fighting to much, some of them were cooperating better".

Informant C argues that maritime clusters bring out similar interests, but if generalizing shipbuilding, recognizes that there are different consequences between a shipbuilder and a shipowner if a ship's delivery date is delayed. This correlates well with what informant B suggested:

"Some risks will you prefer to keep for yourself. Some risks might be advantageous to be together about. And, typically planning and progress planning, and dependencies and risks linked to that, would probably be beneficial to have a common approach. As for the finance (…) and on quality it probably isn't".

Even between the two shipyards, what is experienced in the question of the approach to a project between the parties involved is somewhat different. One stated:

"The non-cooperative interest approach is most commonly encountered. Of course, this varies somewhat, but basically there is little contact with the shipyard and customer about the parties' experience of the risk picture. This is because, as of today, there is no tradition of joint risk management during the project"

While the other shipyard first identified differences when entering commercial phase:

"No, pretty much it's a cooperative approach to things. And it is clear that when it comes to (...) and you go a little over in the commercial phase and there is talk of contract and conditions, delivery and these things, the climate changes quickly"

Informant G shares the experience of non-cooperative interest approach at the same time as highlighting one of the main benefits of a collaborative approach:

"No, what is normal is the last thing you say (non-cooperative interest approach). Where you have contracts that are selective in relation to optimization, while in an alliance contract or in an integrated collaboration contract/project delivery contract then you will optimize the project and not your own contract at the other's expense. So that (...) it is clear with this form of contract I think will become quite (...) widespread. Also, it is a form of contract that may not suit everyone, but (...) and all projects, but with those who are motivated, large ownership and want to go that direction then I think it will create better projects, greater value optimization of projects"

4.4 Most common risks

Many of the risks mentioned by the informants are somewhat similar, but since they together represent different parties and operate within different segments with different vessels, each one is presented for itself.

Informant A lists the most common risks based on experience as following: *"Technical data and materials/components delivered timely, scope and solutions decided and frozen, stay within budget, deliver on time, unforeseen events"*.

Further concluding that the biggest risk is the causes that affect budget and delivery-time negatively. Health, safety, and environment (HSE) are what informant B states as the most common, important risk that must come first given both the elements in building a ship, along with the consequences if something goes wrong. Large investments represent a financial risk. The informant argues that as long as you manage to keep up with planned time and finances the quality will follow, but if the time is surpassed, then the finance will fail and result in an unsuccessful project.

Informant C starts with acknowledging the financial risks attached to a shipbuilding project. The same informant is the only participant which mentions conceptual design risk, which can challenge your delivery time and budget. If one were to rank common risks, the informant places the right quality at the right time as the two biggest, in the post-contract stages.

The overall risk is according to informant D to keep progress and quality, which represent great challenges. Avoiding injuries on personnel working during construction does not necessarily result in only tragic for those concerned, but also generate delays and increased costs. The informant stresses the importance of stepping in from day one with minimum demand on safety and quality.

Tight schedule, many stakeholders involved, sub-suppliers and sub-sub-suppliers are factors that contribute to risks resulting in delays, a very common issue, informant E adds. Interestingly, this informant is the only one to point out the risk of having a quality error on the software. Often this is tested late, in the critical phase of commissioning during sea trials. Further, the informant neglects the quality risk, as the risk-owner for quality is the shipyard, while at the same time recognizing the financial risk involved in a shipbuilding project.

Not surprisingly, informant F shares some of the risks mentioned by informant A. Deliveries from for example designer at the right time and to the right quality, is stated as

incredibly important by informant F. This may be related to the fact that this particular shipyard regard itself as competitive on project length, so the risk of late delivery from suppliers, inefficient documentation flow and lead times are pointed out as crucial risks to have control over. Complexity and/or new technology puts pressure on the shipyards ability to identify, evaluate, and break down necessary actions to ensure maintaining their strong capability of delivering on short time.

On-land construction projects represent one risk which will not be covered further, *ground conditions*. However, informant G also mentions risks that are comparable for the subject in the thesis, for instance, the risk of running beyond the original defined scope in traditional projects. In a traditional implementation model, the builder defines this completely dependent on having the correct understanding of the market's ability to deliver and expertise, thus making it a little chance game. Another interesting risk brought up by the informant is the market risk, which can vary quite a lot. Delays are also to be considered as a risk.

Six out of seven informants, all from the maritime domain, was asked whether the most common risks they listed based on their experience were transferable to all ship types. Two out of six, both shipowners (B & D), argues that the risks are transferable. Admittedly, informant B states that even though some ships are much more complex than others, there is often a variance in the size of components that have complexity and the number of dependencies attached to the components. Both shipyards partially agree with informant B and D, but acknowledge that new technology or complex technical compositions present other types of risks versus 10 identical newbuildings with well-known and proven solutions. Additionally, informant E points out the fact that each ship type has its own risk profile, depending on the purpose of the ship and performance. This is supported by informant C, which argues that the conceptual phase pre-contract differs between ship types. Although the same informant concludes with that delivery at the right time and the right quality, is two risks transferable to all ships.

4.5 Success in terms of risk management

In order to understand what each informant based successfulness in terms of risk management in a completed shipbuilding project, they were asked how they measure success and if today's' risk management routines and processes need to be developed in order to achieve these success criteria's.

Informant A measure's success as following:

"The ship delivered on time, within budget and scope, customer satisfaction. Identified risk is managed and minimized".

This corresponds with Informant E which in addition lists the performance criteria, matching the expectations for the newbuilding. Informant E and D emphasize the HSE section, addressing that avoidance of serious harm to those involved or worst cases, fatality, are in themselves success criteria. Informant D also point to the success criterion, delivered on budget, but also emphasizes that it must be in accordance with the delivery date stated in the contract.

Only one of the informants', participant B, point out specifically taking advantage of opportunities:

"If you manage to avoid big risks on cost and time kicks in or taking advantages of opportunities then you have succeeded in risk management. And by knowing what they are, you can focus on them and extract benefits, and at least with the knowledge try to prevent the disadvantage".

Informant F highlight the fact that commercial success is not necessarily linked with good risk management:

"(...) it can even be if you experience an increased margin in the project when you pack together and put the project on the shelf and you have earned more than you predicted, it does not mean that you have had good risk management. So it's not comparable in that way, but there are probably some KPIs you can put there. Obviously, it becomes very obvious in those projects where you have poor project management or risk management. But (...) yes, we are very good at measuring in margin about how well it went commercially".

The informant states they actively set some parameters early, measure them along the way, resulting in a finished document at the end of the project delivery showing their success

on risk throughout the process. One criterion mentioned was the fewer variation orders or C/Os present, the better they succeeded.

Informant G was asked to take into account traditional projects on-land, how success was measured:

"Success on risk. No that is when you have completed the project (...) you have the answer for the risk hopefully. If you do not have the answer for the risk then you will end up in court then"

Whether it is necessary to develop today's risk management routines and processes, as a means to achieve the success criteria's mentioned there were different opinions about. Both informant D and E points to their experience in relation to shipbuilding. While informant D shares that none of their last 16 vessels have gone over budget, their track record of getting delivered on date, informant E argues that each project has to have their own control system. As both these informants' stress their experience, informant D acknowledges that as long as they have the same resources as of today, there is not a need for implementing new actions or changed routines. But, if the company were to change modes of operation or new resources were recruited, the system in place needs to be considered if it is good enough.

Informant B pointed to responsibility in the project:

"The yard has a much greater obligation to relate to time, it is (...) we must live with consequences, but it is not our responsibility as a shipowner. So for us it is the financial, perhaps the one we have to steer most. But we must chase the time risk, but up against the yard that is responsible".

The same informant's employer has taken the action of establishing a controller to gain control of financial risks and follow up to a greater extent than before. Informant A, on the other hand, recognizes both the current room for improvement and is positive in that the current risk management routines and processes can be developed:

"The most important thing is that the entire project organization understands that good risk management gives control over implementation and that risk-reducing actions are determined, implemented and evaluated systematically".

Focus on culture and attitude, accept that there will never be such a good level that one can say that one is satisfied with regard to risk management emphasizes informant F and:

"(…) having a sense of competence enhancement when thinking about risk management, and the importance of the small detail that you are responsible for, can have such great consequences. It is always a continuous work".

This is somewhat mentioned by informant C which doesn't necessarily think that a fancy IT program will help, but being aware of the risks, document them and speak about them in important forums.

Given that informant G has changed the approach towards risk management, the question was whether or not it was absolutely necessary to further develop their routines to achieve success in risk management. The informant answers yes, due to the incentives to do so:

"By sitting in an interaction and handling items completely open and transparent, giving a whole (...) then you drop this tactical game, right. Where in the past you squeeze out the parties because you have some information that no one else has. In an interaction with openness and transparency and trust, which is very fundamental, then you will not be able to run that game. And then you get a genuine handling with the fact and the uncertainty around the various risk elements".

4.6 Conversion projects

Seen from the shipyard's perspective, conversion projects are favorable in comparison with newbuilding projects according to informant A. The risk picture is somewhat not as extensive, often because it is clear what the customer wants and further substantiate this with:

"The starting point for conversion projects is a finished building, and contractual scope and solutions for the conversion have to a greater extent been clarified and locked. The greatest uncertainty then normally lies in the scope of paid change orders/increase in scope".

As informant F has limited experience on conversion projects, the informant only elaborates in general what their approach to those type projects would be:

"We organize ourselves equally. What is the difference, is that it often becomes very hectic and places great demands on good coordination. But you don't have time to set up the same systems that you do in a big project, right"

All four informants representing the shipowner agree that there is an increase in risk on their behalf. Although informant B has not participated in conversion project for current employer, the informant assumes based on the knowledge that conversion projects have a more complex picture of risk, despite the risks are not necessarily as great. Adding that any adjustment in completion and time will bring much more direct consequences to the earnings of a ship. Informant C consider rebuilding and conversions having greater risk levels in comparison with newbuildings.

Both informant D and E address the scope of a conversion project. Informant D emphasizes that this type of project is challenging because of what you are unable to define, results in the yard taking significantly higher prices than normal, given that they are already pressured on contract prices to win the tender. Informant E exemplifies this by installing a crane. Since the shipowner himself has carried out project planning and engineering for the crane and is therefore responsible for it, if the design is not correct with regard to foundation drawing with steel mass, cable length, etc. the shipowner suffers financially. Informant E concludes with:

"Normally shipbuilding contracts are quite good to define the cost, for the five year old class renewal is more moderate, but the conversion problems are the highest ones in terms of your risk for overshooting your budget both in time and money".

Both the shipyards and the shipowners was asked if they changed routines and processes when entering into a conversion project. When it comes to routines and processes for risk management in conversion projects, informant A states that they are not necessarily changed, but there is less risk to consider. Informant F supports this, but concretizes the challenge with such projects in terms of risk management routines and processes:

" (...) there is a higher risk that you miss something, but at the same time if you have a contract and made the agreement that makes you handle that risk because everything except what we have agreed on must go on hours, then you have in one way control of the risk".

Even though every informant representing the shipowner side express they don't necessarily change the principles in routines and processes, each informant explains some adjustment. Informant B:

"I would say that the routines and processes are very similar, but they are much more sharpened (...) much more tight in time".

Similar to informant C, arguing that it may need some customization, supported by informant D which states that the same principles apply. This fits neatly with what informant E describes:

"No, we use the same approach, but we size up the team more".

4.7 Potential benefits with JRM

What each informant would see as potential or experienced benefits with JRM was naturally asked. Informant A believes that this can be positive for risk management, since it is in the interest of both to complete the ship on time, within budget and scope. In addition, the informant sees potential advantages in handling risk management jointly as it will:

"A reconciled risk picture means fewer conflicts, better decision-making processes and increased efficiency".

Thus, providing significant benefits such as better delivery time in terms of deadline, HSE, budget, and scope.

Shared interests and contribution to a more correct and comprehensive risk picture of the entire project is something informant C also points out. This informant highlights the fact that there are some risks in a newbuilding project which the two parties prioritize slightly different, which could have beneficially been viewed together. In terms of financial benefits the informant points out:

" (…) so I think that by doing so together, in principle half of the resources can be used and I also think that many of the risks can be uncovered much earlier, that there is openness from both sides and when it is uncovered sooner have smaller consequences (...) if for example there is a delay in delivery time, the yard would like to hide that as long as possible and not inform the ship company, because they hope to catch up some of it and (...) but if the shipping company knew about it very early then there certainly will have less consequences for then you can postpone (...) rent other vessels to take pre-ordered cargo or postpone selling tickets if there are passenger ships and such for the new vessel (…) , so I think that it will give a better financial picture for both parties".

Informant E believes one benefit will be earlier delivery time along with a better vessel general speaking. Some other interesting points made by the informant is how some

projects with new or developing technology might be easier to get granted, due to common risk sharing:

(…) "if you approach them with an idea, and say: okay, I take partly risk for this idea, and you take partly risk for this idea *then the parties might join together for a lower price than if the other party is going to take more risk for this "crazy" idea. And then you can get more development or new types of propulsion line for example, or (...) if a maker comes with a good idea and he has to convince both the shipyard and the shipowner, and maybe the class, it can die away. But if he convince the owner, and the owner can join forces with the maker and can get the shipyard on the side, and the shipyard doesn't have to take that much of the risk for it, then you might have suddenly new more efficient propulsion lines. (…) So this joint risk management can help that the vessel get (...) the owner get something that is more efficient or dimension that will help you in your market afterwards while the shipyards can still be able to build it because they don't have the performance risk of it"*

Informant B and D agree that it will be easier to handle the project, as informant D states quite clear:

"The better you cooperate, the better it is".

The latter informant also adds potential benefits on achieving acceptable quality to a greater extent. Informant B on the other hand finds HSE as the easiest part to collaborate on versus other variables present, although adding that it may be easier to possibly gain common goals and understanding of risk in general:

"So there it will be a common understanding of why things are done (...) is an advantage and relatively easy to quantify. On finance risk, then it is not as interesting to have a common understanding of (…) if we do that then we save a lot of money (…) it can be that if we have an agreement on which level we are supposed to be on, you may reduce the costs and it is one (…) there is a level of pricing of risk in a project with great uncertainty. So, if you have great uncertainty about how things should be done and the level you are going to lie on, then the supplier (yard) will have to add it to their offer. So if you get the level of uncertainty down, you get the cost down (…) Not real cost, because it will be the same anyway, but the contract price".

Instant feedback is achievable through open communication, informant F highlights. Hundreds of decisions are necessary during a shipbuilding project, thus the informant believes that with a more open honest appearance and a predefined role clarification, that will help speed up the decision-making process. In addition, informant F raises an important factor concerning the tactical game between the parties:

"Openness and visibility is always good because one raise the predictability, one does not have to wonder what the other party's next move is. But when that is said, that's not how we do business, in a way trying to speculate and find holes in (...) to have personal gain. It's not the way we do, probably many people do that, but I don't think it's our stand".

Informant G was asked what great benefits are experienced in sharing the risk management jointly, also referring to the tactical game:

(...) "For example, on ground conditions, you will be able to agree that here we need some more ground condition surveys right. To secure the project. The volume of ground condition surveys are likely to be significantly higher than in an old contract form. And thus common risk on both sides is reduced and, not least, it reduces the overall risk of the project and removes the possibility of running a tactical game about any future claims related to the ground conditions, the risk of ground conditions".

The same informant reveals another benefit achieved through JRM such as optimizing time for the cost which in turn generates ideal construction time evaluated from a broader perspective:

"After all, both quality, time and cost are related and if you handle the cost bit of risk then you will implicitly handle time and progress".

Lastly, the informant adds that if you have an incentive model that supports this approach, both business model and motivation is safeguarded.

4.8 Potential challenges with JRM

In the interest of identifying potential benefits with JRM, it was natural to also ask about what they reckon would be the major challenges to achieve this form of collaboration. The informant C believes there is little used energy of discussing this on top of each organization. Therefore, the informant sees this as the one major challenge in reaching JRM. Informant B raises some interesting points on how today's climate is and why JRM will be a challenge:

"There is something about the complexity and size of these projects that you want to deliver from you an amount and not take responsibility for being involved in all the processes (...) If you want to participate in such joint risk process then you must be much more involved in the work. Then the contract form will necessarily be changed. Or you must have a pre-project, a pre-phase, a project development phase, where you can take down the risk to reduce the cost, increase the quality, take down the risk of time etc. Time is perhaps a little different in the sense that there you might take advantage of a joint risk assessment through the project, but on cost and quality then you almost have to do it before you say what it should cost"

Informant E stress it's all about money and if you were to do such collaboration, the challenge of controlling the suppliers:

"If you not controlling your suppliers and you are getting delayed, the shipyard has a possibility to give you a notice that they cannot deliver the vessel with the equipment, they can deliver the vessel without it. Because their risk is on their side is that they are not able to deliver the vessel. They are not getting all the money for the vessel, because I'm delayed for something I'm coming in with".

Informant D shares that both parties have their secrets, especially the yards, which could be a challenge to cooperate closer. Previous experience with yards does not attract the idea, and the informant exemplifies this with a project not being executed on fixed price:

"After all, that has been tried before. Just what you said there; Yes, okay. If we are going to be totally unrealistic and if manage to complete this project on this baseline (...) and if we do so, against a realistic estimate, let's say 40 million over (...) then there is such a common earnings pot in between the owner and the builder. It has been tried".

The informant does not want to specify that example further.

The biggest challenges experienced by the implementation of IPD, informant G points to change of mentality:

"It is that you challenge other parts of the employees' heads, because you challenge them to work differently both with regard to you sitting much more together, you have to relate to employees. Yes, so the customer/supplier relationship is different. You sit together and you often forget who your employer is".

Co-location is considered to be absolutely crucial, at least when running different sections of the project to reach solutions. Thus, commitment to sit together, sufficient planning tools are mentioned as important factors which have been a challenge. Another interesting point made by the informant is the peaks of revenue:

"With those IPDs you change your business model (...) and it creates an average higher contribution to the contractor, which has several IPD projects compared to traditional models. You can, in traditional models, have some projects that go extremely well, but then you utilize the contractor perhaps to a greater extent. So, on average, better earnings, but you do not have the big peaks and the risk is less for the supplier/contractor so that you do not have the larger wave numbers either then".

Thus, maybe naturally why informant F express:

"You are totally dependent on having this predefined".

The informant A does not think such a joint collaboration will necessarily be an economically or strategically bad idea. Both parties, on the other hand, can profit from such cooperation. However, the informant adds potential challenges for JRM:

"Good processes for JRM included in contract. Transparency and common forum for decision-making and evaluation of these"

4.9 Reluctance to share

Any particular step in the risk management which the parties involved would not like to share openly is likely to challenge a joint collaboration approach. Therefore all informants were asked if any such steps are preferred for only internal handling. There are no particular steps in the risk management the informant A's employer wants to keep confidential to the customer. The informant believes that if one is open about identified risks during the start-up phase, and these are further evaluated and focused on throughout the project's lifetime, this can be positive and provide increased value creation for both the customer, shipyard and subcontractors. Informant B, C, D, and E all point to the financial factor. Financial surveys performed on the shipyard, and during price evaluation with the particular shipyard, one might show your weaknesses. As one shipowner states:

"(...) some possibilities and risk disadvantages were sharing information about what that is (...) is directly correlated to the yards opposite (...) so it's kind of natural that it's not exchanged".

This is supported by informant C:

"(...) in relation to concept and early stages that if one look at the rapid development in society and it is clear that being a bit early out with your ideas, often you want to protect the concept for a while".

Admittedly, informant C acknowledges the fact that you can only protect your idea for so long.

Informant E divides what is shareable and not:

"As long as you put them in generic terms then it's possible to share of course, but we don't share specific items like that but (...) and they are project specific anyways".

Informant F points to a need to do things differently if approaching a project such as JRM suggests. Even though informant F stress they do not speculate in projects, it's clear in general that this is business when it comes to submitted technical specifications which are open for discussion and subjective interpretations:

"The potential huge upside to find constructive good solutions, which also customers are happy with, but which you earn even more money on".

This brings back the tactical game of it, which informant G neatly summarize:

"If you are thinking of the client side then (...) it is clear (...) you do not give full transparency to all information 24/7, you do to a degree run a tactical game about when to inform about type of change which you know comes. At what time you should involve the supplier/contractor, how these changes can affect the project. If we wait a month then maybe we have finished other things, the contractor has made some other purchases, shall we then come with it? How early should we introduce such things? That's completely gone. You are completely open, and once you identified a risk, you have to get it up in the registry and start processing and managing it. If not then you are not transparent and open".

4.10 Contract

The contractual aspect of a shipbuilding aspect was important to investigate among the informants, in order to identify opportunities or challenges. One informant, C, introduce this aspect quite well, with previous experience of working with different types of ship contracts:

"Of the approximately ten new buildings that I have seen, I cannot say that I have seen anything in the contract that does not allow such cooperation to be carried out. I have never seen such things, so I do not think there are things in the contracts that stop the cooperation, but there is rarely anything in the contract that encourages cooperation either, so that could have been done better of course".

Informant A, do not either look at contracts as a major challenge. It's about both parties being willing to cooperate on this. On the other hand, informant B points out that the collaboration must be prepared through the contract:

"The advantage is that what we talked about a little on earlier, is if you get the uncertainty down, you get down the cost which is everyone's advantage, but the possibility of getting it before contract is near zero. And the consequence of possibly getting it into a process must be incorporated into a contract in a way that I haven't seen before".

Informant F is not particularly engaged in the details of the contract process, but in general, believes it belongs in the contract:

"The clearer things are defined in the contract and to more reasonable it is, the easier it is to deal with the project implementation afterwards (...) I have yet to be involved in a

project where you hadn't have to go back and read the contract, to get some backup or disconfirmation of what you think (…). So that type of relationships and which parties and how you commit to working together I think belong in a contract. Not necessarily in the main contract, but as an addendum".

Informant E argues the need for some kind of incentive that helps all parties to work together in the contract terms. Although points to one issue:

"For a shipowner it (...) you might get the ship a little bit earlier, to a better quality for it, but you also might get more contractual risk towards the shipyard and more consequences".

The informant continues with different contractual aspects which are beyond the scope of this thesis but acknowledges that for example Ship 2000 is not sufficient as of today. From informant D's perspective, contractual conditions are crucial:

"It always boils down to contractual conditions. The one who has the best, have been the best when setting up the contract and has been the best throughout the project to take care of all important decisions, documented everything that (...) the different things that is going on, they win. Regardless".

The informant follows up with summarizing quite well what is the current contractual climate in relation to risk management:

"Yes, specification of contract, it means everything for risk management. The documents you have when you start with the construction is the (...) hierarchy is the contract, then the specification comes, then comes the arrangements. Those three. Then there are some different appendixes and which equipment the vessels should have and such. If not, if you are not careful and do a proper contract, specification and AE job then you lose. Because the yard they (...) what they will often try, they will try to get this in the most general terms. So there is room for interpretation, right, and we will have that minimized. We want specifics when it comes to type, capacity and everything like that. Everything should be specified in a proper way, you also have such refinements in the contract that lawyers have entered that you have to be very careful to discover what (...) if you are to formulate them or rephrase them so it reflects what is to happen. That is a difficult job"

The informant G is in no doubt that the IPD type of contract could be used or is transferable to a shipbuilding project. This justifies the informant with:

"(...) it's a lot similar. You just build a ship. So, if you build a hospital, build a complicated business building or build a refinery or a platform, or a road construction then in principle it is not very different. It is, of course, the scope and type of project that is of course different, but in overall, it is the same".

4.11 Digitalization

A buzzword in shipping has and still is, digitalization. Each informant was asked whether or not digitalization may encourage or force the parties to jointly handle risks in projects in the future. Informant G considers the old traditional contract models/contract standards are not necessarily suitable for digitalization and further believes that the digitalization wave will force other contract strategies/contract models, using IPD as an example. Other benefits by digitalizing the project, is in particular, making decisions both better and faster, according to informant G.

The risk of complicating the project process by digitalizing it is something informant C highlights. Further, the informant stresses the need to fully integrate it into the daily operation of the project in order to save its value. This is in a way supported by informant B, which doesn't believe that digitalization necessarily is the solution to all problems. The current project informant B is a part of, is the first approximate paperless project process experienced, but at the same time the informant acknowledges the potential benefits:

"But the answer is yes, had we been there, then of course a transparent process would have been beneficial for both parties. My task on the shipowner part against the yard is not to arrest them on what they are doing wrong, but to try to illuminate where I see it can go wrong, such that it does not go wrong because it is beneficial for everyone. But if I don't have the information then I can't do that either, and that's where the digitization comes in (...) that then you get transparency and common information so you can illuminate and help the process all the way".

Informant A agrees that it may open up opportunities for greater collaboration through digitalization. The informant shares that today they work on a common platform with the customers, although not within this topic, and sees that risk management could have been a good additional product for such solutions. This is closely supported by informant B:

"(…) For it is clear that it is interesting with (...) what is most relevant for us is document management and comment follow-up/version follow-up and inspection comments and follow-up of it. Closing it, so that when you say something is in order, both parties agree that it will be closed in the system and that there is within the same database, huge advantage. But it is interesting to think about how you could pass it on to some form of risk identification, and (...) most importantly, the plan. Common plan follow-up in a digital system, instead of sending paper plans back and forth. Do not know about a platform that is suitable, but it is certainly an interesting thought".

Both informant D and F argues that they are today quite digitalized. Informant D, representing the shipowner, addresses the benefits of plan/drawing approvals through a platform provided by the current yard, and that the yard is not allowed to do anything before it is drawing-approved by the customer. Further, the informant points to the improvement compared to previous technology with sending sets of drawings with comments back and forth.

Informant E expresses that digitalization brings new perspectives on project execution, reduce work, easy identify previous comments as well as emphasizing some key elements:

"It's a new way of thinking and you need to have some kind of progress reporting or some kind of evaluation. Because plan approval is a part of approving your vessel. And it's important in terms of how you approve the vessel, because you signed a contract with the builder, and then we have a vessel in the end. And during that, it's many approvals. It is plan approval, it is acceptance on a weld, and it is acceptance on the sea trial, acceptance any place. And in the end it is an acceptance of vessel. When you work together you need to have some kind of mean of acceptance of the level, otherwise you don't stop. You can weld on the weld throughout the whole project in a way, it's no reason for that because then (...) so in terms of working in cooperation in a digital setup there must (...) it should be some kind of method that you still secure this acceptance level".

Table 13 summarize the findings from each sub categories.

Mechanism	Main findings	
Project risk management and its value	• Quality, time and finances • Transfer risk • Obtaining control over risks • Risk management is crucial	• Safety • Culture • Following processes and routines • Defining items
Routines and processes for risk management	• Risk analysis • Risk identification • Meeting-based risk management	• Risk register • IMS • Clear differences between the shipyards
Type of approach	• Type of approach varies • Contractual responsibilities	• Commercial phase • Project team composition and chemistry
Most common risks	• Scope • Software • Market • Delivery time and quality • Delay from suppliers	• Safety (HSE) • Financial • Documentation flow • Complex technical compositions
Success in terms of risk management	• Delivered on time • Customer satisfaction • Few C/O's	• No serious injuries • No legal claims • Within budget, scope

	• Identified risk is managed and minimized • Taking advantage of opportunities / prevent disadvantages	• Performance matches expectation
Conversion projects	• Limited time • Power ratio turned • Change orders / increased scope • Changed contractual responsibilities	• Sharpened routines • Unevenly financial risk • Direct consequences of earnings
Potential benefits with JRM	• Increased efficiency • Increased predictability • Fewer conflicts • Earlier identified risks • Common understanding • Easier to handle the project • Reduced overall risk for the project • Same interests of delivery time, budget and scope	• Financial benefits • HSE • Better decision-making • Instant feed back • No or less tactical game • Optimizing time for cost • Correct and comprehensive risk picture • Sanction of projects with new technology
Potential challenges with JRM	• Co-location • Previous experience • Controlling suppliers • Time spent pre-construction	• Contractual agreement • Increased involvement • Need for changed mentality • Top-board must be motivated

	• Less high and low peaks in earnings	
Reluctance to share	• Financial records • Specific risk items • Concept design and business case	• Contradictory interests • Potential financial upsides
Contract	• Contracts open for collaboration • Incentive model • Ship 2000 not sufficent • IPD is suitable for other industries	• JRM must be defined • Today's contract climate • Increased contractual risk
Digitalization	• Reduced work • Opportunities for JRM • Not necessarily the solution • Today's contracts are not modern	• Faster decision-making • New perspectives on projects • Transparency and common information

Table 15. Results - Main findings

5. Discussion

5.1 Project risk management and its value

Project risk management is vastly covered throughout project literature and is regarded as an important element within a project. Lester (2017) pointed out that projects are risk-prone and need to be considered from day 1. PMI (2013) describes the perception in general organizations have towards risk as following: “Organizations perceive risks as the effect of uncertainty on projects and organizational objectives. Organizations and stakeholders are willing to accept varying degrees of risk depending on their risk attitude (PMI, 2013, p.310). Aarseth et al. (2016) assert that dealing with risk is management responsibility. This corresponds with Rolstadås et al. (2014) which underline the fact that it is the management that takes decisions on project execution. Mantel et al. (2001) claim that the field of risk management has over the last decade has grown considerably. Therefore, when Meredith & Mantel (2012) claim that the necessity of risk management for both threats and opportunities has increased because projects are becoming more complex and ill-defined, the execution of risk management today may be more relevant than ever before.

All informants participating in this study agreed that risk management is of high importance, stressing the point of having control of key items within the project. Informant D’s consideration of risk management as something that is merely at the yard’s capacity, while their focus is on financial control, is one example of organizational risk attitude. Therefore the findings support the literature.

5.2 Routines and processes for risk management

A number of processes for risk management are available. There are several national standards; in addition a range of national and international associations have published risks management process. Most of them divide risk management into four or to six steps, in which they focus on identifying risks factors, analysis of risk, development of an action plan and follow-up of risks (Aarseth et al., 2016, p.111). Han et al. (2017) stated that shipbuilding is very large and complex. Meredith & Mantel (2012) saw the need for expanding PMI’s six risk management steps to seven; Risk management planning, identification, qualitative analysis, quantitative analysis, response planning, monitoring and control, and **management register**. Only one informant (F) mentioned the use of risk management register in particular. This emerging subcategory separates the informants quite a lot. Between the two yards, one

shipyard may be considered as an organization lacking systemized routines and processes (today) in comparison to well-integrated culture and focus on risk handling at the other yard. In terms of why the two yards differ to such a large extent may be explained by different risk attitude or organizational culture. Meredith & Mantel (2012) further underline that the process of risk handling is not stationary: "It must be emphasized that the process of managing risk is not a static process. Rather, it is ongoing, with constant updating as more risks are identified, as some risks vanish, as others are mitigated – in other words, as reality replaces conjecture – and new conjecture replaces old conjecture" (Meredith & Mantel, 2012, p.226).

One of the most surprising findings in this study was the admittance to an informant that one does not have routines for risk management. No project literature supports the idea of not establishing risk management routines in projects, and therefore this finding deviates from the theory.

Meeting-based risk management as a routine or process was mentioned by all shipowners. To what degree these meetings address risks were not commented, except by informant C which elaborated with bringing in resources from different internal disciplines to discuss current risk picture. Meredith & Mantel (2012) describes this type of monitoring as quite normal; "Senior managers usually insist on face-to-face meetings for staying informed about project progress, and these meetings may touch on almost any subject relevant to the project (or not). (...) A large majority of project meetings do not concern senior management. They are project team meetings, occasionally including the client, and concern day-to-day problems met on all projects" (Meredith & Mantel, 2012, p.444). Therefore, meeting-based risk management could be argued to be in line with what the theory suggests.

5.3 Type of approach

In terms of what kind of approach each party has, both when entering into a project, during the construction, as well as after the project might vary between the participants. There is a mixed interest in payment intervals, when to address necessary C/O's, post-contract opportunism, and contractual conditions. What is usually shared between the two parties is pre-defined in the contract (Rahman & Kumaraswamy, 2002). "According to the PMBOK, risk management is a systematic process of identifying, assessing and responding to project risk. The overall goal is to maximize the positive opportunities and minimize the negative consequences of an uncertain event" (Osipova & Eriksson, 2013, p.393). The conflict of

interest between the two parties in terms of positive opportunities and negative consequences may introduce different approaches as a result of project participants having own objectives and seek to on behalf of their organization optimize their results, instead of the project itself. Osipova & Eriksson (2013) argued further that a strong emphasis on maintaining control hampers collaborative project environment, thus not facilitate for JRM. Meredith & Mantel (2012) argues that different environments, especially corporate culture can dictate the project approach: "The manner in which the process of risk management is conducted depends on how one or more environments impact the project. The corporate culture is one such environment. So, consider, for instance, the impact of a strong corporate "cost-cutting" emphasis on how risk managers identify project risks - they will probably focus on the project's cost elements, such as personnel and resource allocation" (Meredith & Mandel, 2012, p.251).

The main findings are covered to a certain extent by the literature. Commercial phase and project team composition and chemistry are two factors not found to be in the literature, thus potential new findings.

5.4 Most common risks

All risk mentioned by the informants, categorized as main findings, is supported by the theory. Aarseth et al. (2016) list some important factors that are exposed to risks related to project execution; safety of staff, finances, the scope of work, quality, schedule, and cost. The same risk items are what PMI (2013) use when defining project risks. The informants addressed following as the most common risks; scope, safety, software, financial, market, documentation flow, delivery time and quality, complex technical compositions, and delay from suppliers. Zhang et al. (2012) pointed out how current project management systems at shipyards in Asia is manual and which adds both time and layers. With today's fast technology evolution, it is natural to think of how this also affects new ships.

In later years, more stringent regulations on air pollution, in particular, has forced engineers to come up with solutions to reduce air pollution for the maritime industry. Cruise ships, ferries and other types of ships, for example, have in recent times changed the type of propulsion to battery-assisted propulsion systems. This challenges the yard in terms of complex technical compositions, where unforeseen risks are considered to increase versus traditional solutions. It also results in sea trials becoming more challenging as they often

involve more complex software setups. The size of investments needed for building a new ship also represents a financial risk, naturally. With the increased role played by the marine equipment industry, delays from suppliers who deliver up to 50-70 % of product value on a commercial ship, is a risk item that can have increased in the latter years (Ecory, 2009). Brief phases of prosperity and long phases of depression which Volk (1994) categorize shipbuilding as supports the finding of market risk although that risk item was mentioned by the informant representing on-land constructions.

5.5 Success in terms of risk management

Success in regards to few C/O's, delivered on time, within budget and scope, and performance matching expectations can all be linked to how sufficient the technical specification was when starting the process of building the ship. Hans, Herroelen, Leus, & Wullink (2007) points out a number of undesirable characteristics that are associated with failing projects such as budget overruns, compromised project specifications, and missed milestones. This can be interpreted as if one doesn't manage and minimize identified risks throughout the project. The researcher's highlight time, cost and quality as basic dimensions of project success. Rolstadås et al. (2014) points to four elements of project success that can be linked to risk management; schedule, budget, quality and stakeholder expectations, all which represents key performance indicators of project outcomes. The same authors refer to a success factor that influences on success, indeed client acceptance. This factor is determined by whether the client (shipowner) accepts the end-result. No serious accidents during the construction is a natural success factor as one wants to prevent this at all times. Rahman & Kumaraswamy (2002) also pointed out that legal claims are reduced with appropriate and clear risk allocation between the parties. The literature purpose four strategies to take advantage of opportunities and four strategies to prevent disadvantages (PMI, 2013).

Therefore, it is reasonable to declare the success factors the informant's lists correspond with what the theory suggests. In the matter of necessity to change, the routines and processes used today to be able achieving these success factors, five out of seven suggests to continuing further development within the theme. This might be linked to more complex and ill-defined projects today in contrast to before that Meredith & Mantel (2012) addressed.

5.6 Conversion projects

In order to protect themselves against high newbuilding prices, shipowners have increasingly seen the possibilities of utilizing conversions by adapting existing vessels to different roles (Ecory, 2009). Michalski (2017) pointed to conversions as the cheapest solution when a shipowner wants to satisfy specified requirements. Conversions is an accelerated process that is based on hopeful outcomes with predictable negative results (Spar, 2004). The accelerated process corresponds well with how the informants perceive conversion projects such as limited time and sharpened routines. When conducting a conversion project, there is a changed project climate. If a shipowner wants to build a new vessel, the owner expects a finished end-product based on the technical specification and design to a fixed price. A conversion project introduces new risks in terms of not knowing exactly the condition of the vessel before it enters the dock. Then, when the shipowner contracts a scope of work with a shipyard, surprises might come to occur, which may force C/O's or increased scope of work. In this scenario, the shipyard is positioned with a great deal of power towards the shipowner. When the project plan for a conversion project is submitted, no further changes may be made without a formal C/O (Mantel et al., 2001). Agreed C/O's result in added cost and time variations to the budget and schedule (Lester, 2017). Ill-defined conversion projects may cost the shipowner substantially, as the shipyard is already pressured on the fixed contract price for winning the tender. Zhang et al. (2012) implied that project scope will commonly be changed as new orders will be added after a vessel called on the shipyard for repairing, that conversion projects might be categorized as.

The main findings are therefore fairly in accordance with the literature. Direct consequences of earnings would be if the vessel already was in operation for the given shipping company pre-conversion. The change in the balance of power between the two parties results in increased financial risk for the shipowner.

5.7 Potential benefits with JRM

A category that also is one of the research questions. The literature points to several factors in construction projects which JRM can affect positively. Zhang et.al (2012) revealed manual, semi-autonomous and impede decision making as conditions within shipbuilding in Asia. Slow document flow process that creates projects becoming time-consuming and difficult to track. Osipova & Eriksson (2012) pointed to risks being dynamic and might require different types of response, especially in the early stages of the project and collaborative efforts among the project actors help to manage such risks. In their case study of two different construction projects, one finding was that the control-oriented project did not address changes adequately, resulting in a conflict between the client and the general contractor. The flexibility-oriented project handled many changes waived by the end-user, which were solved successfully. These changes did not delay the final date of completion, as the joint collaboration contributed to higher flexibility in the schedule, at the same time as having a strong focus on keeping to timetable. Cooperative teamwork between the contractual parties is by Rahman & Kumaraswamy (2002) to be an effective condition for managing conflicts.

Aarseth et al. (2016) points out that companies seldom have the skills and capacity to delivery everything themselves. Collaborative relationships are therefore needed to carry out a complex project. The authors refer to studies that clearly states a correlation between project success and major challenges that are linked to collaboration and the project managers understanding of context, network and optimizing of the whole project. The nine principles of IPD; *Mutual respect and trust, mutual benefit and reward, collaborative innovation and decision-making, early involvement of key stakeholders, early goal definition, intensified planning, open communication, appropriate technology, organization, and leadership* should provide a foundation for the potential benefits the informants' lists when asked about potential upside with handling risk jointly. Kahvandi et al. (2017) concluded in their study what proper IPD implementation provides: "facilitates enhanced share of information and early identification of stakeholders through a proper timing as vital keys to realize objectives of the construction projects, reduce risks, and increase the chance of project success" (Kahvandi et. al, 2017, p.99)

As the main findings are mutually positive and can be linked to either IPD's nine principle or other previous studies, there are no contradicting benefits between the main findings and the literature.

5.8 Potential challenges with JRM

If one were to enter into a JRM approach for a newbuilding through the IPD-model, the shipowner acquiring a new vessel is expected to participate to a greater extent than normally, especially in the start of the project, because the integrated process requires early involvement (AIA, 2007). This might be a substantial challenge for implementing IPD in shipbuilding as some findings from the shipowner side shows that both previous experience and, earlier and increased involvement does not attract the idea. With today's' technology co-location is possible through online communication platforms which AIA (2007) address: *"*Locating the team in a joint facility may facilitate open communication and cooperation, and regular meetings and video conferences may be useful when co-location is impractical" (AIA, 2007, p.14). Therefore, co-location as an absolute necessity is not to be considered to be in correspondence with the theory. Leufkens & Noorderhaven (2011) found in the Dutch shipbuilding industry a pattern of perceived negative interest towards integrated collaboration. This coincides with one finding which suggests the need for changed mentality. Osipova & Eriksson (2012) found that control-oriented risk management resulted in very poor collaboration, as well as poor ability to adapt to changing conditions. JRM became instead risk transfers to each other through the risk register.

Fairly most of the findings are either supported or countered by the literature. Some challenges such as; *motivating the top-board, controlling suppliers* and *less high and low peaks in earnings* are difficult to address in terms of literature found on the subject but could be considered as new challenges which shipowners connect with JRM.

5.9 Reluctance to share

The literature presents general principles for sharing and the importance of overcoming conflicting interest in being able to focus on common interests centered on project goals. One of the four different strategies to enhance potential positive risk opportunities is *Share*. A strategy which seeks to allocate ownership of the opportunity to the stakeholder which is best capable of seizing the opportunity beneficial for the project. Aarseth et al. (2016) also pointed out each company involved has its own interest and perception on other project participants. Appropriate contracting method, coherent and unbiased contract documents do not necessarily ensure project success with projects including uncertainty, complexity, diverse interest and conflicting agendas (Rahman & Kumaraswamy, 2002).

Leufkens & Noorderhaven (2011) stated that multi-organizational projects require to overcome conflicting interests in order to collaborate and further concluded with: “The shift to integrated collaboration seems to be predicated on an early selection and involvement of key suppliers who would then openly share knowledge and share in the risks of the project” (Leufkens & Noorderhaven, 2011, p.440).

The AIA (2007) points out that traditional project execution may suffer from project success not necessarily linked to each participant's financial success, which may be detrimental to the project itself, and points to the importance of incentive: “Methods of compensation that tie the participant’s success to the overall success of the project are powerful tools for unifying individual and project success. In IPD, individual financial success relies on project success. For that reason, the IPD participant’s natural instinct to protect and improve its own financial interest results in behavior that benefits the project” (AIA, 2007, p.11). When mutually positive intentions are perceived by all individuals attached to the project, trust is gained (Martin & Songer, 2004). Results from Doloi (2009) suggested that JRM becomes better as the perceived trust and confidence among the partners become higher.

The main findings show that both shipowners and shipyards need to change their traditional predetermined interests in order to manage risk jointly, before embarking on such cooperation.

5.10 Contract

Building or converting a ship is contracted work. One finding suggests that JRM must be defined in the contract, which is clearly supported by the literature. The contracting parties involved in shipbuilding or conversion projects will be allocated their obligations and responsibilities through the conditions of the contract (Rahman & Kumaraswamy, 2002). Another finding was the split interest between the shipyard and the shipowner to what extent the work should be specified. This could be drawn to Fisher (2008) who highlighted three different price formats which address the risk of cost overruns. A fixed price and agreed-upon changes will challenge the shipyard if cost overruns occur. A cost-plus contract will reduce the shipyard's risk level. And the third option, sharing of cost overruns, will even-out the financial risk between both parties. In the Project Alliance model responsibility of major cost overruns are designated to the owner, SPE itself carries unlimited responsibility, while in

Relational Contracts the liability may be limited to each other, but the owner bears the ultimate risk in terms of success on financial or performance goals. The need for incentives was also raised by the informants. IPD-approach provides various project-based incentive models, dependent on which out of the three MPA one were to choose to use. One informant had never seen a shipbuilding contract that encourages or discourage collaboration. Rahman & Kumaraswamy (2002) points out that successful project delivery depends on attitudes and cooperative relationships between contracting parties and project participants.

To achieve contract success, Lester (2017) stress a need for focusing on factors such as good cost control, good site management, careful planning, timely deliveries of equipment and material, and good relationship between the contracting parties among other things. Kahvandi et al. (2017) suggested in their study that contract issues were reduced by the implementation of IPD. Contradictory to traditional contracts, relation agreements are based on and requires mutual trust, transparency and clear communication (Hoelsher, 2018). Relative to a projects unique risk profile, Relational Contracts may suit certain projects and stakeholders better than others (AIA, 2007).

The findings which indicated low motivation to increase contractual risk, contradicts with integrated project delivery, although Relational Contracts have similarities to traditional contracts. Literature provides guidelines for collaboration, roles and responsibilities allocation, incentive model through a contract.

5.11 Digitalization

This category emerged from the data analysis as there were some interesting findings attached to it. Transparency and common information, faster decision-making, and reduced work is somewhat the opposite of manual, semi-autonomous and impede decision-making which Zhang et al. (2012) found at Asian shipyards. Thus some findings suggest possible benefits with digitalization within shipbuilding projects. An IPD approach requires sufficient IT technology in order to gain savings in project cost and time, as it reduces changes and duplications (Kahvandi et al., 2017).

Today’s contracts are not modern and digitalization provides opportunities for JRM is interesting new findings that are not found in any literature. Further discussions about digitalization are beyond the scope of this thesis.

6. Conclusion

This study has investigated projects within the shipbuilding industry, the risk management aspect of such construction work, and an alternative project management method that implies closer collaboration between contractual parties and stakeholders. In an explorative matter, the aim was to achieve an understanding of today's practitioner's risk management motivations within shipbuilding projects, in addition, to explore possible opportunities associated with the implementation of JRM. The answer to the first research question in this study: *To what degree is risk management used as an active process in Norwegian shipbuilding projects at shipowner's and shipyards* is somewhat diverse. One surprising finding was that one informant admitted to not having any routines for risk management. There is found to be large differences in integrated routines and processes for risk management between the two shipyards participating in the study. From the shipowner side, some have incorporated sufficient routines and processes accumulated throughout their long existence, while others rely on meeting-based risk management.

The answer to the second research question: *What are the possible benefits of Joint Risk Management between owner and builder in a complex newbuilding or conversion project* there are multiple opportunities in jointly handling risks for both project types. There are benefits to achieve with JRM, in particular regarding budget, scope and delivery time. However, it comes with a cost, where the shipowner needs to participate more and the shipyard would need to be completely open. There is found to be some hesitations for both these actions from each side. Today's climate does not reflect by any means JRM per definition. As one informant mentioned, there is no tradition for it. In total, both parties will gain when jointly manage risks, a comprehensive correct risk picture of the entire project. Complexity and/or new technology puts pressure on shipyards in terms of risks, as well as JRM can support or lie foundation for better and more efficient ships. JRM will generate positive opportunities and minimized negatively consequences with the project in mind, instead of at the expense of each other.

The question is; are the parties involved motivated to optimize the project and not their own contract at the other's expense, in order to achieve greater value optimization? If so, an appropriate contracting method does not necessarily end with project success in a highly complex and diverse interest climate. Therefore, both parties must abandon the tactical game which today's project climate consist of and be motivated to implement JRM, and have financial incentives to do so which needs to be part of the contract. IPD's project model could be used as a guide for customizing such approach in shipbuilding projects. A joint collaboration for risk management may be more likely if both parties have previous good relationships, acceptable financial backbone, shares the same project goal and corporate culture, and is comfortable working with digital tools. Digitalization will contribute to common information and could enhance transparency, which in the end secures the acceptance level of the ship in hand. It all comes down to what risks that are present in a shipbuilding project the two different parties are willing to take and share, which will reflect each party's risk attitude.

Five out of six actors from the maritime domain pointed out if they were to participate in a JRM it had to be a part of the contract. Therefore, further research on this topic could examine the contractual aspects to a greater extent than this study does and construct an incentive model for JRM, for both parties in contractual terms. A second suggestion for further research is to examine how the project-climate between the shipowner and shipyard is in an ongoing project through observations. This could contribute to identify and explain the mechanisms of the tactical game, which the industry consist of today in shipbuilding projects.

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APPENDIX 1 – INTERVIEW GUIDE

Introduction questions (for all informants)
1. Can you tell me short a little about your own professional background? 2. How long how have you been working in this company and what is your position? 3. Have you worked on both the builder and the buyer side? 4. Can you elaborate on your working experience with shipbuilding projects? (Nationally / globally projects?)
Main questions - Part 1
1. What is project risk management for you and to what degree is this of importance in a shipbuilding project? 2. What type of routines and processes does this company have for risk management? 2.1. Is there any particular IT / Support - system this organization use? 2.2. Are the client/builder involved in this process? 3. Have you experienced big differences between the maritime organizations you have worked for, in regards to the approach to risk management? 4. In your opinion; Would you argue that the parties involved in a shipbuilding project often pursue a collective interest approach or is non-cooperative interests approach more common? For any option: Why so? 5. During a shipbuilding project, which risks are the most common based on your experience? 5.1. Can you rank these from most common to least common? 5.2. Are these risks transferable for all ship types?

6. How would you measure success in regards to risk management in a completed shipbuilding project?

7. To achieve these success criteria, is it possible to further develop today's risk management routines and processes?

7.1. Are there any actions this organization has implemented to improve the success rate?

8. Are conversion projects as difficult to handle when it comes to risks as newbuildings?

If yes: Are the same routines and processes mentioned before used in conversion projects?

If no: Why are conversion projects less difficult, and do you change the routines and processes in relation to risk management here?

Hand over JRM – definition

Main questions - Part 2
1. Do you have any immediate comments to the definition of JRM or are you familiar with this concept? 2. What do you think would be the major advantages in handling the risk management jointly between a builder and a buyer? 2.1. Have you experienced such an approach before? If so; can you elaborate a little bit? 3. What could be done to enhance such collaboration? *If necessary sub-questions;* 3.1. Is it purely down to contractual matters? 3.2. Would you consider it as vital for the existence of shipbuilding in Northern-Europe? 3.3. Are there any particular steps in Risk Management, your organization does not want to collaborate on? 4. What would be the major challenges to achieve JRM in your opinion? *If necessary sub-questions;* 4.1. Is it purely down to contractual matters?

4.2. Is it financially or strategic a bad idea?

5. Do you agree that with successful Joint Risk Management, this form of RM can contribute to significant benefits in shipbuilding projects?

5.1. What benefits are potentially achievable?

6. Digitalization may provide more open databases between the yards and buyers as they may coordinate projects on a common platform; Do you think digitalization may force or encourage the parties to jointly handle risks in projects in the future?

Final questions

1. Summarize findings

2. Have I understood you correctly?

3. Is there anything you want to add?

Additional questions if time:

Can you elaborate a little bit on the current shipbuilding project you are working on today or the last project you were involved in?

Were there any dynamic joint approach in the previous or the ongoing project?

APPENDIX 2 – NSD ASSESSMENT

NSD NORSK SENTER FOR FORSKNINGSDATA

NSD's assessment

Project title

What are the possible benefits of Joint Risk Management between owner and builder in a complex new-building or conversion project?

Reference number

614829

Registered

17.01.2019 av Daniel Johansen - 110585@student.usn.no

Data controller (institution responsible for the project)

Universitetet i Sørøst-Norge / Fakultet for teknologi, naturvitenskap og maritime fag / Institutt for maritime operasjoner

Project leader (academic employee/supervisor or PhD candidate)

Lars Christian Iversen, Lars.Iversen@usn.no, tlf: 31009328

Type of project

Student project, Master's thesis

Contact information, student

Daniel Johansen, danieljohansen01@hotmail.com, tlf: 91734229

Project period

01.01.2019 - 15.05.2019

Status

07.02.2019 - Assessed

Assessment (1)

07.02.2019 - Assessed

Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet med vedlegg den 7.2.2019, samt i meldingsdialogen mellom innmelder og NSD. Behandlingen kan starte.

MELD ENDRINGER
Dersom behandlingen av personopplysninger endrer seg, kan det være nødvendig å melde dette til NSD ved å oppdatere meldeskjemaet. På våre nettsider informerer vi om hvilke endringer som må meldes. Vent på svar før endringer gjennomføres.

TYPE OPPLYSNINGER OG VARIGHET
Prosjektet vil behandle alminnelige kategorier av personopplysninger frem til 15.5.2019.

LOVLIG GRUNNLAG
Prosjektet vil innhente samtykke fra de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse som kan dokumenteres, og som den registrerte kan trekke tilbake. Lovlig grunnlag for behandlingen vil dermed være den registrertes samtykke, jf. personvernforordningen art. 6 nr. 1 bokstav a.

PERSONVERNPRINSIPPER
NSD vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen om:

- lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen
- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke behandles til nye, uforenlige formål
- dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet
- lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet

DE REGISTRERTES RETTIGHETER
Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: åpenhet (art. 12), informasjon (art. 13), innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18), underretning (art. 19), dataportabilitet (art. 20).

NSD legger til grunn at NSDs mal for informasjonsskriv benyttes, og at informasjonen som der gis om behandlingen oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13. Malen må tilpasses det individuelle prosjektet.

Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER
NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32).

For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og/eller rådføre dere med behandlingsansvarlig institusjon.

OPPFØLGING AV PROSJEKTET
NSD vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til med prosjektet!

Kontaktperson hos NSD: Håkon J. Tranvåg

Tlf. Personverntjenester: 55 58 21 17 (tast 1)