The Delivery of Island Wellserver

Master’s Thesis
M. Sc. Management of Innovation and Business Development
Espen Welde
July 3rd, 2009

Supervisor: Dr. Kjell Tryggestad
Department of Organization
Copenhagen Business School, 2009
Executive Summary

This study deals with Island Offshore Subsea, and the delivery of their new vessel; Island Wellserver. The topic has been examined through two research questions:

1. How have the key requirements for the success of Island Wellserver’s delivery been managed?

2. How has the delivery of Island Wellserver impacted IOSS’ capabilities?

Island Offshore Subsea (IOSS), together with their alliance partners, provide various shipborne services within increased oil recovery for companies operating offshore oilfields. The study will specifically deal with the work that went into getting Island Wellserver delivered and operational, and how IOSS managed their own effort and the contributions of their alliance partners, in the face of delays and technical obstacles to fulfilment.

The study was carried out through combining assorted scientific papers on relevant topics with empirics collected within and outside the case company. There are primarily two sources of empirics, namely newspaper and magazine articles, and interviews with persons holding key functions in the project.

It was found that IOSS initiated the project under challenging circumstances, which in turn influenced the learning and project management negatively. Island Wellserver turned out to be a very complex project, and was evolving throughout the work, being adapted to changing technical specifications. The particular partnership structure, the alliance, is a prerequisite for IOSS to be able to deliver a complete service to their client, but turned out to be a demanding constellation in times of uncertainty. The cooperation with the client, Statoil, has been close and productive, partly because Statoil had concerns about certain technical aspects, and therefore monitored the progress closely. Looking at the impacts of the project, IOSS has certainly been exposed to substantial project experience, which could be helpful in developing their skills for future, comparable efforts. However, the at times stressful and hectic nature of the work may also have limited the value and effectiveness of the learning opportunities. Furthermore, IOSS is seeking similarities in the design and operation of their vessels, which can be a source of competitive advantage if learning economics are achieved, but the specialisation could also cause a lock-in effect with the client.
# Table of Contents

Executive Summary ................................................................................................................................. 0
1 Research Question and Purpose ........................................................................................................... 4
   1.1 Introduction ................................................................................................................................... 4
   1.2 Research Question ......................................................................................................................... 5
   1.3 Presentation of Theory .................................................................................................................. 7
      1.3.1 Knowledge ............................................................................................................................ 7
      1.3.2 Knowledge Transfer .............................................................................................................. 8
      1.3.3 Project ................................................................................................................................... 9
      1.3.4 Project Management ............................................................................................................ 10
      1.3.5 Learning ............................................................................................................................... 11
      1.3.6 Modularity ........................................................................................................................... 12
      1.3.7 Supplier Integration ............................................................................................................. 13
   1.4 Delimitations .................................................................................................................................. 13
      1.4.1 Intention of Study .................................................................................................................. 15
   1.5 Structure ....................................................................................................................................... 15
2 Methodology ....................................................................................................................................... 17
   2.1 Collection of Empirics ................................................................................................................... 17
      2.1.1 Written Sources .................................................................................................................... 17
      2.1.2 Interaction ............................................................................................................................ 18
   2.2 Properties of Case Studies .......................................................................................................... 20
   2.3 Relevance of Methodology ........................................................................................................ 21
   2.4 Academic Literature ................................................................................................................... 23
3 Background ....................................................................................................................................... 24
   3.1 Light Well Intervention ................................................................................................................. 24
   3.2 Island Offshore Subsea ............................................................................................................... 25
   3.3 Island Frontier ............................................................................................................................. 26
      3.3.1 Application for Acknowledgement .................................................................................... 29
   3.4 Technology ................................................................................................................................... 29
      3.4.1 The Advances of Island Offshore Subsea ......................................................................... 30
   3.5 Working in an Alliance ................................................................................................................. 33
   3.6 The Client ..................................................................................................................................... 35
4 Current Issues ..................................................................................................................................... 37
4.1 Recent Developments in the Industry ................................................................. 37
4.2 Human Resources ................................................................................................. 38
4.3 Island Wellserver .................................................................................................. 40
4.4 Project Management in the Delivery of Island Wellserver ............................... 42
   4.4.1 Interfacing with Alliance Partners ................................................................. 43
   4.4.2 Client Involvement ....................................................................................... 46
4.5 The Future Market for RLWI ............................................................................... 46
4.6 The Outlook for IOSS ......................................................................................... 48

5 Analysis .................................................................................................................. 52
   5.1 Observations ....................................................................................................... 52
      5.1.1 “A Bridge too Far” ...................................................................................... 52
      5.1.2 “Caveat Emptor” ..................................................................................... 53
   5.2 Discussion ........................................................................................................... 54
      5.2.1 “A Plan is Nothing – Planning is Everything” ............................................ 54
      5.2.2 Maintaining Relevance ............................................................................. 56
      5.2.3 Modularity ................................................................................................. 57
      5.2.4 Managing the Alliance ............................................................................. 58
      5.2.5 Cooperation with the Client ..................................................................... 59
   5.3 Summary ............................................................................................................. 60
   5.4 Theoretical Implications ..................................................................................... 62
      5.4.1 Learning ..................................................................................................... 63
      5.4.2 Modularity and Flexibility ....................................................................... 63
      5.4.3 Projects vs. Strategy ................................................................................ 64
   5.5 Practical Implications ......................................................................................... 65
      5.5.1 Choice of Strategy .................................................................................... 65
      5.5.2 External Involvements ............................................................................. 66

6 Conclusion .............................................................................................................. 68

Appendices:

Bibliography

Dictionary
1 Research Question and Purpose

1.1 Introduction

This study deals with a small Norwegian company, Island Offshore Subsea (IOSS), which has grown and prospered by delivering very advanced and innovative subsea services to oil companies. The different services are often referred to under the common label of “Light Well Intervention”, (LWI), and are an integral part of the business of producing from existing oilfields. For the sake of this study, the oilfields and wells in question are located in the North Sea, primarily the Norwegian Continental Shelf (NCS), and to a lesser extent, the UK Continental Shelf (UKCS). The technicalities of LWI will be presented later in the study, but for the purpose of clarity, one can think of it as necessary maintenance of existing subsea oil wells, traditionally being performed from semi-submersible drilling rigs. While often both necessary and profitable for the oil company operating the well, this has always been a very expensive and time-consuming operation (Tvedten, 2003).

Island Offshore Subsea was established in 2005, with the intention of providing light well intervention services from the vessel Island Frontier, in cooperation with external suppliers of services and equipment. The potential for cost-savings by ship-based LWI had been the subject of much interest in the business for several years, (R. Friedberg, 2009) but the technology had not been available to conduct the operation in a way that adhered to the strict environmental regulations on the Norwegian Continental Shelf.

The alliance headed by IOSS, however, succeeded in developing an acceptable method for Light Well Intervention from a vessel, rather than a drilling rig, and soon received a six-year contract with the largest Norwegian oil company, Statoil. In time, this went so well that Statoil renewed the contract with Island Frontier, while also procuring the services of a new vessel, the Island Wellserver. This vessel will be the focal point of this study, representing a quantum leap for the company, and being the world’s first vessel purpose-built for “Riserless Well Intervention”, RLWI (Island Offshore Management, 2006a). Island Wellserver has, at first glance, a striking resemblance with the four year older Island Frontier, both having the conspicuous shape of an offshore service vessel, with the added features of helipads at the bow and module handling towers amidships. However, the “Wellserver” is substantially bigger, with displacement being nearly twice that of its predecessor. It is also a product of the experiences made with the “Frontier”, and the knowledge of what promotes or obstructs safe and effective operations.
The origins of Island Wellserver will be thoroughly discussed in this study, and includes the experience gained at IOSS and alliance partners from operating the “Frontier”, the expectations and requirements from the client, and the internal ambitions for the project. On the other hand, such a comprehensive project will certainly have a profound and decisive impact when conducted by a small and young company, therefore it is imperative to also pinpoint and analyse the implications the project has for IOSS. Accordingly, the theoretical focus will be upon the project management that has taken place until the delivery of the “Wellserver”, as well as the transfer and future application of knowledge gained throughout the process.

1.2 Research Question

Before the research questions can be presented, their empirical and theoretical foundations should be briefly introduced. Empirically, the focus of this study will be upon the actions taken from IOSS’ part, in order to ensure a timely delivery of functioning components from all alliance partners, including themselves. The delivery is to be understood in this study as the process with Island Wellserver from the planning phase, throughout the follow-up of alliance partners’ and own contributions, until an operative well intervention vessel can commence contract.

Island Wellserver, being similar to Island Frontier in some respects, yet representing substantial technical progress, makes the presence and nature of learning and transfer of experiences an interesting and open topic. The implications of the general project management that has taken place is also of interest, since this is decisive for the communication and coordination with the external contributors. Finally, given Island Wellserver’s dominant position in IOSS’ work, the impact on IOSS of the delivery is also an interesting issue. Looking into the delivery of Island Wellserver, coupled with the overall situation of IOSS, certain concepts within theory arise as relevant and necessary in order to deal with the subject in a satisfactory fashion. First and foremost, a sound theoretical basis within projects and their management is necessary, and since the study also deals with the application of experience, the concepts of knowledge, knowledge transfer, and learning will also be discussed. Furthermore, the research also requires a theoretical basis within a projects’ trade-off between flexibility and predictability, also incorporating a discussion about the role a supplier might play, and their level of integration.
The overriding topic is:

**The Delivery of Island Wellserver**

Which in turn is best analysed by the use of two more specific research questions, each applying parts of the preceding literature and the empirical input relevant to the particular phase of the work.

3. *How have the key requirements for the success of Island Wellserver’s delivery been managed?*

and:

4. *How has the delivery of Island Wellserver impacted IOSS’ capabilities?*

For the purposes of this study, the requirements for achieving success in the delivery of Island Wellserver can be dealt with sorted into four groups: Firstly; IOSS’ application of their own accumulated experiences and knowledge from working with RLWI in the project management of the delivery. Secondly; Island Wellserver’s technical functionality and performance according to the requirements of its intended tasks. Thirdly; IOSS’ continuous management and coordination of the contributions from the alliance partners and the regular suppliers. Fourthly; IOSS’ maintenance of a constructive relationship with the client, Statoil, throughout the process. All of these issues need to be dealt with effectively from IOSS’ part in order to deliver a vessel that works to the satisfaction of everyone involved, and exceeds the performance of Island Frontier.

At the moment of project closure, it is appropriate to take a step back, and look at how the project has impacted the company conducting it, which is the purpose of the second research question. Given the complexity and scale of the project, getting the most out of the lessons learned is an obvious chance at cutting costs, saving time, and improving the quality of the projects already in the pipeline. The second research question therefore addresses IOSS’ ability to learn from the work they conduct, and whether or not it can transform experience into applicable capabilities among its employees. In turn, the output of this process is capable of impacting the future direction, options and prosperity of IOSS, in ways that might have been thought unrealistic or unthinkable only few years back.
1.3 Presentation of Theory

Much of the academic literature on project management seems to deal with projects of relatively modest size in terms of cost and duration, set in an environment where several such projects are running simultaneously in a company, thus competing internally for resources and management attention. The delivery of the “Wellserver” certainly falls outside this category, as it has held a dominant position in the work of IOSS, and was agreed to while IOSS was still very much a start-up, struggling with the operability of the “Frontier”. However, considering the process up to commencement of contract through the lens of project literature is still reasonable, as it has a pre-specified time and budget, and is built to perform a known function upon completion. Regardless of the properties of the delivery of Island Wellserver, many of the arising issues in this type of work are such that typically are addressed in project literature.

1.3.1 Knowledge

First and foremost, the concept of knowledge should be clarified, as it will be applied extensively in the next sections, as well as throughout the study. Boisot (1998) presents an excellent division between data, information, and knowledge, building on the amount of meaning they convey for the receiver. Data are mere observations of facts, not by itself spurring to action or carrying meaning. Information is data put into a context, turning data into a meaningful message for the receiver, providing a better chance of generating a correct response. The existence of knowledge requires both the presence of information and the abilities of the receiver to perceive and apply that information in the correct manner. The distinction is also summarised in the following way:

“Knowledge builds on information that is extracted by data”

(pp. 12)

To illustrate this line of thinking in the operations of Island Frontier, one can think of “4 metres” being data, “4 metres significant wave height” being information, while a subsequent reflection that if the weather deteriorates any further, the well intervention has to be aborted, would qualify as knowledge. For the use of this project, emphasis will be placed on knowledge, as much of the issues dealt with are about developments in a highly competent and specialised environment, were the participants are well versed with the terminology and operations of LWI. Therefore, the receiver of data or information will very often have the qualifications to immediately turn it into knowledge.
1.3.2 Knowledge Transfer
Enberg, Lindkvist and Tell (2006) explore knowledge integration in project teams, with a case study of a development project as their point of departure. They specifically address the success of knowledge integration within a team, compared to how tightly knit together the team members are. The study uses the case findings to challenge the notion that extensive co-location and face-to-face communication is a precondition for effective knowledge integration, referring to the dispersed location of team members and their varying perception of commitment to a common goal. Instead, they found that extensive task homogeneity, meaning similarity of tasks across projects, had a positive impact on knowledge integration, both for clarifying the presence of competencies among team members, and for sharing a common grasp on the basic draft of a technology. Furthermore, they emphasise the importance of taking a dynamic view on knowledge integration, ensuring that learning is shared effectively throughout the project, rather than taking a “stock”-approach; pooling the available knowledge at the initiation.

Coakes, Bradburn and Blake (2005) studied knowledge management at a UK construction company, Taylor Woodrow. An interesting finding was that successful knowledge management could function as an alleviator against the inherent risks in construction projects, complementing or partly replacing conventional, costly insurance. In the case-study of Taylor Woodrow, it was found that the organisational culture was receptive to knowledge sharing, and so informal peer recognition, rather than monetary incentive schemes, had been an effective driver. It also became clear that functional internal webs were useful as enablers for knowledge sharing, but would be insufficient as drivers on their own.

Another excellent text on effective utilisation of knowledge is Georg Disterer’s “Management of project knowledge and experiences” (2002), presented in the Journal of Knowledge Management. It refers extensively to observations from a range of industries, and addresses the challenges of capturing knowledge when a company is continuously engaged in a number of parallel projects. The study is performed against a backdrop of an ever increasing number of companies organising themselves by projects, as a response to the need for more agile and innovative companies. He advises towards accessible project closure reports with assigned contact persons, contributing positively in future projects, as well as easing the incorporation of new personnel into the particular competencies of the company. This is thought of as an effective way of counteracting the negative effects the one-off nature of projects may have for knowledge transfer, as well as assisting in diffusing knowledge through the barriers that may
exist between projects and permanent organisation. Furthermore, failures must be embraced and studied as the most effective opportunities for correcting erroneous practices, requiring a management effort to create an open and supportive atmosphere for learning, in line with that apparently achieved at Taylor Woodrow.

1.3.3 Project
A project may be understood in several ways, but there are some intuitive boundaries that spring to mind. For most, it will have to do with an effort towards a pre-specified delivery, be of limited duration, have a largely pre-defined scope, and at least initially; a clear budget. Paul Roberts (2007, pp. 288) defines a project as:

*A temporary management environment, created to deliver a specified outcome according to a defined business justification.*

This definition seems to emphasise the capabilities of the output over the nature of the process, or those that perform the required work. A well-established set of metrics for a project is the iron triangle, visualising the project manager’s need to prioritise between time, cost and quality. The iron triangle, and the surrounding line of thinking, requires that the output is known and specific, and is thus in line with the stated definition. However, Atkinson (1999) challenges the completeness of the iron triangle, arguing that forecasted duration and cost will always be limited to a best guess, and that quality is fundamentally hard to quantify, realistically amounting to a phenomenon. Focusing solely on these parameters, he argues, equates putting too much effort in avoiding a type I error, or false positive, thereby being prone to committing type II errors, or false negative. Instead, he presents a new and evolved framework for the measurement of project success, called “The Square Route”. This takes an augmented view on the deliverables of a project, placing the iron triangle alongside three other groups of parameters, namely “The information system”, “Benefits (Organisational)”, and “Benefits (Stakeholder community)”. For IOSS, the relevance of this view is evident. Focusing solely on a timely delivery on budget could be counterproductive, if IOSS intends to operate the Island Wellserver successfully for, say, 20 years. If that is the case, they have a vital interest in grasping the potential benefits for themselves and the client from the very start of the planning, perhaps also if it means postponing the date of delivery, or exceeding the initial budget. Such benefits could be to increase the scope of work it is able to undertake, rethink certain elements of the design in order to achieve increased safety for the personnel, or improve the sea-keeping capabilities, thus achieving additional days in operation, servicing the client’s wells faster.
Kreiner (1995) has authored a most interesting article on the relevance of a project in the face of drifting environments, challenging the notion of the project being set in a static situation. The concept of the inherent uncertainties of a project is in line with Atkinson’s text (1999), and strengthens the indication that it is necessary to maintain a flexible view of both a project’s contents and success measures. Specifically, Kreiner argues that the parameters and the information present at the launch of a project may not be complete or entirely correct, and that freezing the specifications of a project at the outset based on this information may therefore be counterproductive. Drift can be caused by changing preferences at the customers, competitors changing strategy, or the management changing preferences, all of which threatens to erode the relevancy of the end product. He does, however, state that environments may not truly be drifting, but that companies will be better off by assuming that they are, making a static environment a pure bonus.

1.3.4 Project Management

Project Management, then, should be the constructive approach to carrying out and delivering a project in the best possible manner, by the application of an organisation fit for the purpose. One rather traditional definition states:

The planning, monitoring and control of all aspects of a project and the motivation of all those involved in it to achieve the project objectives on time and to the specified cost, quality and performance.


While a slightly elaborated version emphasises reaching those objectives safely, under the auspices of a responsible manager:

The planning, organisation, monitoring and control of all aspects of a project and the motivation of all involved to achieve the project objectives safely and within agreed time, cost and performance criteria. The project manager is the single point of responsibility for achieving this.

(The UK Association of Project Management, cited in Atkinson, 1999, pp. 338)

Nevertheless, the two definitions cited do not differ in any substantial ways, and both can easily be accepted. For the purposes of this study, these definitions will not be challenged or discussed for the sake of discussion, as they are of a delightfully general and intuitive nature. However, the second definition seems somewhat more applicable to a project being
conducted in a highly operative environment, stating the crucial condition of safety, and the lonely role of the manager. Paul Roberts (2007, pp. 12), on the other hand, defines project management in a more unorthodox way, namely in terms of ensuring that all stakeholders share the common answers to five fundamental questions defining the particular project:

1. **Who needs to be involved in managing a project?**
2. **What must a project deliver?**
3. **When must it deliver?**
4. **How much must be invested?**
5. **Why is this project necessary?**

The profound agreement and understanding of the answer to these questions, shared by everyone involved, ensures that there is an environment that allows for the effective conduct of a project. In the case of IOSS, the first two definitions make perfectly sense, but may be thought of as taking a rather conventional view on the project, in line with the critique of the iron triangle. The augmented view that is the foundation for Roberts’ questions, specifically address the importance of keeping all stakeholders on the same page. For IOSS, this would suggest the inclusion of the client and the alliance partners from the very start of the project, in order to maximise the success of the output, being the operational Island Wellserver. The “synchronising” of stakeholders could be useful in ensuring the commonality of goals and visions, and smoothening the interfacing between the deliveries of the alliance partners.

### 1.3.5 Learning

It is very important for an innovative organisation to be able to learn, as the alternative would be stagnation and a swift decline to oblivion. Management guru Peter Senge (1990, pp. 14) defines a learning organisation as one that is “continually expanding its capacity to create its future.” Learning, however, is a rather intangible concept, and requires the concerted work of everyone involved in order to be as beneficial as it can be. Bohn (1994) offers a definition that fits neatly with the steady progress in IOSS:

> Learning is the process by which knowledge is created from experience and the path by which improvement takes place.

(Bohn, 1994, cited in Kotnour, 2000, pp. 393)

Being the sole operators of this novel technology only serves to underline the importance of learning from experience and creating its own future, as IOSS does not have a realistic option
in looking at competitors for ideas and waiting it out. They thus have to do what Peter Senge
describes as “create its future”, and they have to do it alone. The concept of organisational
learning has been the focus of numerous studies, dealing with how an organisation may or
may not build useful knowledge from the experiences the individuals gather. The presence or
absence of organisational learning can be caused by in-house policies or the conduct of
individuals. Effective learning in a project environment may be particularly challenging, due
to the uniqueness of each project and the limited time horizon. Kotnour (2000) argues for the
importance of building knowledge, stating that his survey concludes that increased knowledge
is associated with increased project performance. He goes on to specify that learning must be
sought both within and between projects, and be pursued throughout the existence of the
project, rather than solely in a lessons-learned session upon project completion. In his 1999
article, Kotnour discusses the project manager’s role in organisational learning, specifically
pointing out the motivation said project manager has to achieve a successful learning process:

“The learning process is important because it is a means to help a project manager
achieve three goals: (1) to deliver a successful project, (2) to deliver a series of
successful projects, (3) to build capabilities.”

(pp. 32)

After conducting a survey, he finds that project managers do practice both inter- and intra-
project learning. This has the dual purpose of supporting the project team members’ reflection
on own project performance, as well as supporting the knowledge transfer to other projects.
However, while his 1999 article states that evidence remains inconclusive regarding the effect
of learning processes and calls for further study, his 2000 article goes a long way in
supporting the assumption about beneficial effects.

1.3.6 Modularity
The concept of modularity may be of interest to IOSS and this study, given that the company
enters a situation in which the same services are to be performed by partly interchangeable
equipment and crew from different, yet similar vessels. Also, the fact that the components
onboard come from several suppliers, all developing their own equipment in-house, suggests
that much of the philosophy behind modularity could be beneficial for IOSS. Ron Sanchez
(2000) makes a strong case for the blessings of modularity, referring to his experience and
research with mass production of consumer goods in very high volumes. Although the
application to IOSS may seem far-fetched at first, due to the obvious difference from
assembly line production, it can be argued that some of the reasoning should be of interest to IOSS in their daily operation of the pool of vessels. The successful application of modularity requires breaking a product down in its functional components, and securing a working interface between them, so that each component may be developed and replaced without requiring rework of the other components. Obviously, this requires a profound commitment to modularity by both management and organisation, and may entail costly rework of production facilities. For IOSS, not operating any production facilities themselves, modularity would require them to instruct their suppliers and alliance partners to innovate and deliver within a certain technical set-up, so that the various components onboard a RLWI-vessel may be replaced individually, with as little adaptation as possible.

1.3.7 Supplier Integration
In line with the argumentation and motivation for the use of modularity, it is also interesting to examine the level of supplier integration in some detail. As will be detailed in a later section, IOSS operates in an elaborate business model called an alliance, working both with regular suppliers and independent alliance partners. Studying their level of integration at various stages will be a crucial element of the project, and so a relevant theoretical framework is required. Petersen, Handfield and Ragatz (2005) performed a survey on the effects of supplier integration during new product development, departing from previous studies outlining its beneficial effects. Petersen et. al. goes into further detail within certain issues, studying the effects of management policies, timing of involvement, and financial returns. Concluding upon their hypotheses, they advocate the importance of selecting suppliers of compatible cultures, and involving those suppliers when setting technical metrics and targets. Inputs from the suppliers on purely commercial metrics were found to be less important for the eventual success. The favourable output of supplier involvement was found to centre on the early involvement of suppliers in order to achieve a better decision making in the project, thus a better design altogether, in turn leading to a more successful product in the end. The application to IOSS’ situation is evident, in that they may or may not involve the various suppliers and alliance partners to a sufficient degree in planning the future RLWI-vessels, decisions that may well influence the later success, especially regarding the functionality of the relevant equipment.

1.4 Delimitations
For the sake of clarity and focus, certain topics will not be dealt with in any detail, even though they could certainly have inspired a most interesting study. IOSS currently has a
number of interesting projects under way, all of which benefit from the knowledge that has been built up over the years, and contribute experience back to the technical community onshore. The RLWI-vessel Island Constructor is also a very interesting undertaking, with innovative design features and great potential for an expansion of capabilities. However, the empirical focus will be on the first two vessels, due to the level of similarity, the common client, and the fact that both are built within the same legal framework, which is that for drilling units on the Norwegian Continental Shelf. Island Constructor is built under a different legal code for operations on the UK sector, works under an entirely different contract regime, and for a different client. IOSS also has a rig currently under construction in China, the Island Innovator, in order for IOSS to be able to expand the range of future services they may offer. While being a challenging project, implementing experiences from the past years of operation, the rig is deemed as being outside the scope of this study, as it is an ongoing project, has a different model of ownership, and is fundamentally different from the conventional vessels.

The motivation for focusing on the two first vessels is the fact that these two projects have the highest likelihood of transfer of experiences, thus being more applicable study objects according to the first research question. These two vessels are also dominant in the work of the Stavanger-based employees, who have been the interviewees and subjects of study. It is therefore here that a development of the capabilities of IOSS and its employees from the studied project is likely to be found. The bulk of the internal empirical work is directed towards IOSS’ project management, and the consequences thereof in terms of developing capabilities. The financial situation of the company will not be dealt with in any great detail, due to IOSS being privately held and therefore keeping financial information internally, but also because the financial specifics are not crucial to the results of the analysis of neither research question.

Regarding theoretical basis, the selected theories are chosen for their applicability towards the research questions and the highlighted theoretical concepts. Rather than collecting an exhaustive list of theories and academics of relevance, the ones included are meant to provide a sound foundation for analysis, and partly represent opposing or complementary views on the same matters. The selected theory is intended to address the most interesting aspects of the work, being those previously identified as key requirements for the project’s success. The purpose of this limitation is to provide validity and breadth to the study, while keeping the amount of theory on a level that allows the reader to easily have oversight.
1.4.1 Intention of Study
The intention and purpose of the study is to provide the reader with an analysis of the process surrounding the delivery of Island Wellserver, and the impact it has had on IOSS, their current and future capabilities. The analysis will look into the conduct of IOSS in running their project, through combining empirics with the presented theories, and thereby finally present a qualified opinion in the form of a concise answer to each research question. Departing from the findings in the analysis, the implications for the applied theories can be discussed, as well as the practical implications for IOSS’ future.

While the work is carried out in the form of a case study within IOSS, the company has had no role in shaping the research focus, or channelling access to certain interviewees or written sources. IOSS may find an outsider’s view on their work and project skills refreshing and interesting, but the intended primary audience of this study remains those taking a predominantly academic interest in the topic. This will particularly be the readers interested in project management in an alliance, and the related concepts previously introduced, or those focusing on the entrepreneurial growth of a SME. A secondary group of readers that could take some interest in the findings are those following the specific industry, or for whom the industry-specific challenges faced by IOSS are interesting or relevant.

1.5 Structure
Having presented the key theoretical concepts that underlie the analysis, there will be a section on the methodology that has been applied when dealing directly with the company and the relevant employees, as well as other empirical contributions. This section will contain a critical discussion on the merits, qualities and limitations of the chosen methodology, relative to the type of study, and what other alternatives that could have been of interest when dealing with the particular case at hand. The chosen literature will also be discussed in light of the methodology, and how the selected and omitted theories fit in with the case and the problem formulation.

Following the methodology, there is an empirical section that describes the industry, the technology, and IOSS’ basis for differentiation. Even though one might argue that this explanation will be outside the analytical scope of the study, I find it necessary in order to introduce the reader to a technology largely unknown to those outside the industry. Being able to visualise the processes and having a reasonable grasp on the terminology will hopefully make the following sections more tangible and interesting. Once this is in place, the
introduction of Island Frontier will be discussed, as the success of this vessel was an enabler for both IOSS’ growth and the ordering of Island Wellserver. Over the years of operation, a wide range of experiences was made on many levels, which have been the subject of much attention both with the onshore office as well as at the alliance partners. Furthermore, the work with getting Island Wellserver delivered will be presented and explained to greater detail, as this is absolutely imperative when creating a logical link to the analysis. In turn, the influence and consequences for IOSS will be highlighted and defined, in order to set the scene for a qualified conclusion on the second research question.

Rounding up the study, the empirics can be analysed according to the stated methodology, and hopefully be combined into an analytical section of relevance and clarity. This will take a critical look at the project management up to the delivery of Island Wellserver, by evaluating it in the light of relevant theory and applicable case studies. This in turn allows for a discussion of the implications the findings may have for applied theory, in terms of relevance and applicability. Finally, the implications for IOSS’ current situation will be addressed, and a conclusion offered that has forward-looking elements, pointing out which abilities IOSS has gained, and what options may have opened up.

Given that the study as a whole deals with niche technologies, there is bound to be an extensive use of technical terms with which many readers will find themselves unfamiliar. These terms will be briefly described at their first occurrence in the text, but all are presented in an informal technical dictionary in the appendix, providing basic explanations of the technologies and their applications.
2 Methodology

2.1 Collection of Empirics
The collection of the empirics has been based on two main sources, depending on the level of specificity required. Publicly available sources have been used extensively for general information on the oil industry, and certain technical information on the vessels of IOSS. The information of a more internal and specific nature on IOSS and its alliance partners, has been acquired through two one-week stays at IOSS’ offices, using interviews with those working there, as well as making general observations of the company at work.

2.1.1 Written Sources
There are numerous sources of renown and thoroughness regarding the current development in the oil industry, both within its technical, economical or political aspects. These are primarily technical magazines, the homepages of equipment manufacturers, classification agencies, and business newspapers. While useful for setting the stage and describing a situation in general terms, they have little significance for the analytical process or findings. One source that has been of particular usefulness for the introductory parts, is a student project equivalent to a master’s thesis, analysing the market for light well intervention on the NCS. This is written by Alf Sturle Eide Tvedten in 2003, thus looking at the market at approximately the time of entry of IOSS, discussing LWI from drilling rigs, and the possibility of employing a vessel like the “Seawell” on the NCS. The study also specifically mentions the Island Frontier, which was under construction at the time of writing. Furthermore, two presentations have been used as sources, and have been useful in the initial phases of the empirical work. Both are made by managing director Robert Friedberg, but while the first was presented at a conference as a reflection on the performance and start-up of Island Frontier, the second was more of a sales pitch for Island Wellserver, stating the ambitions and the expected improvements.

Furthermore, as the oil industry and everyone servicing it is under a stern regulatory regime, just about everything IOSS does, needs to be thoroughly documented and approved by the relevant authority, for the most part the Norwegian Petroleum Safety Authority. The relevance of this fact is that there is a substantial amount of documentation on technicalities, processes, and vessels’ track records, providing a sound and firm basis for analysis. In particular, the “application for acknowledgement” for Island Wellserver was an interesting read, as it details the intentions with Island Wellserver, and the surrounding management
systems. This type of literature is produced by the operator itself, in this case IOSS. However, at the other end of the table, the Norwegian Petroleum Safety Authority observes, evaluates, and approves of the activity on the NCS, and is an authoritative source within their field. Their homepages are an excellent source on the ongoing activity on the NCS, and can be recommended warmly as a source for writers, with their frequent press announcements and accurate information.

2.1.2 Interaction
My reception at the IOSS offices was most friendly and constructive, and the cooperation by the employees was marked by informality, genuine interest and helpfulness. The two stays on location fulfilled two different functions, taking place in the beginning and towards the end of the collection of empirics, respectively. The first week was used for getting to know IOSS and their operations, beyond what could be gathered from open sources. Therefore, the interviews were of a rather general nature, with the interviewee often recollecting events that had happened years ago. Following, a sharper focus could be developed building on the newly acquired knowledge of IOSS. The second week was marked by the fact that Island Wellserver was at a critical stage of finalising, preparing for the final tests and the commencement of contract. However, it was still possible to conduct some useful interviews that provided answers to the more specific questions of this interview round, questions that for the most part had a specific purpose within the established structure of the project. Due to the timing of the second week, and the nature of the questions, several of the interviewees were onboard the Island Wellserver, and so the interviews had to be conducted over e-mail and telephone.

Spending time on location meant that there were numerous occasions for informal discussion and small-talk, often opening up for new and interesting views, or different approaches to known information. “Open doors” policy is practiced extensively, and small-talk around the espresso maker also turned out to be an excellent way of correcting misunderstandings or clarifying issues that had been discussed at an earlier time. In the hallways of the offices, one can find large and detailed models of the vessels, and large posters with technical drawings of the vessels and certain technical components adorn the walls. These were seemingly often used for assistance when the employees were discussing specificities of their work between them, pointing and referring to whatever section or equipment in question. In sum, taking a step back and just observing the informal, day-to-day knowledge transfer taking place, was a valuable input for getting to know the company further.
While informal personal communication is not referenced in the traditional manner, the information gained from such encounters was sought to be confirmed and clarified to the best of abilities, and should not contain any faults of significance. In ethnographic terms, the access to the offices of IOSS provided an opportunity to observe the workings of the company in real-time, and grasp the environment in which the focus of the study is set. This in turn was a major contributor for ensuring the relevance of the questions for the formal interviews. The conventional interviews, on the other hand, had a function of firstly reconstructing past events by those who organised it, while secondly corroborating the information forwarded by other interviewees.

The interviewees have been selected for their in-depth knowledge within specific aspects of IOSS activities relevant for this project, past or present. Most interviews were one-on-one and semi-structured, lasting between 30 and 60 minutes, took place in the office of the interviewee, and were taped for convenience. The point of departure was a prepared sheet of questions, while the points that seemed more or less relevant to the study were elaborated or skipped, respectively. The outputs of these interviews were a number of interesting and surprising facts and information that provide the foundation for the empirical material on IOSS, and could not be found by searching open sources.

The interviews in the first week at IOSS were mostly with personnel that have rather general functions in IOSS, in sum providing a good overview of a number of areas. Two important interviews for getting to know IOSS, were those with managing director Robert Friedberg and project manager Per Buset. Having been key players in the establishment of IOSS and filling managerial positions since, they have a very good overview of what has been going on, and for what purposes. Furthermore, contracts advisor Frode Hansen was interviewed for specific queries about his function at IOSS, and the policies they practice towards suppliers, employees and consultants. An informal discussion with HR-advisor Inger Gravelsæter gave some interesting perspectives on the rapid growth of the company, and what is done to keep supplying the human resources accordingly. In order to focus on the delivery and operations of Island Wellserver, interviews were conducted with technical personnel that were dealing with the arising issues on a daily basis. Operations engineer Kristell Nygård deals specifically with following up the activities of Island Wellserver on a daily basis, both during mobilisation and when in regular operation.
During the second stay at IOSS’ offices, the interviewees were generally personnel with more specific, technical responsibilities in the delivery of Island Wellserver. Interface coordinator Tommy Halvorsen has held a crucial position in the delivery phase, because he is responsible for coordinating the contributions from the alliance partners, making the success of his work an absolute requirement for the operability of the vessel.

For external opinions on the process, points of views have been sought from the client, Statoil, and from the alliance partner that has faced the largest technical challenges: FMC Technologies. From Statoil, I was lucky enough to get access to their project manager for the procurement of Island Wellserver; Geir Gravdal, who held a complete overview of the process from the client’s view. At the time of interviewing, he was also onboard, finalising his work before accepting commencement of contract on behalf of Statoil. The interview was therefore conducted over telephone, complemented with the aid of electronic meeting software “livemeeting”, for displaying documents and charts, a solution that worked to my great satisfaction. The engineering department of FMC Technologies that delivered the module handling tower and skidding system is located in Asker, near Oslo, and so a personal meeting was impractical. However, a short set of questions was answered over e-mail by Geir Ståle Kleppe, who has been working with the most recent phases of the delivery to Island Wellserver, and in fact, was offshore at the time of contact, finalising his work.

2.2 Properties of Case Studies
The nature of this study is most certainly a case study, with the qualities and limitations that includes. Flyvbjerg (2004) puts great effort into rehabilitating the case study as a scientific method of quality and validity, challenging five derogatory opinions on case studies that he has collected, and sets out to justify why he is labelling them as “misunderstandings”. The motivation for this defence of the case study is his positive experiences with case studies at Harvard University, and the firm belief in the qualities of the format he found to be prevalent there. While on the face of it, his standing supports the relevance of the chosen methodology for this study, he does lean heavily onto case studies built around hypotheses. He argues that if the case is chosen wisely, it can be equally valid as a larger survey in evaluating a hypothesis, referring to Popper’s “black swan”, and other examples of critical single cases. Furthermore, he opposes the quest for hard and fast numerical evidence, arguing that meaningful sample sizes tend to be hard to come by within certain fields of social sciences. This is most certainly the case with Island Offshore Subsea and the delivery of Island Wellserver, in which a small, tightly-knit, inter-organisational community is able to make fast
progress after informal consultations. Flyvbjerg goes on to conclude that while surveys of large samples provide breadth to a study, they tend to be lacking in depth. Case studies, however, have the opposite qualities, providing depth into the specific material studied, at the expense of breadth. His stand is that “both approaches are necessary for a sound development of social science” (pp. 432).

The qualitative nature of this case study seemed like the most relevant choice of method, given that it was desirable to investigate the often subtle and informal exchanges of knowledge and experiences. It was also a logical consequence of IOSS being a very small unit of rather informal organisation, where quantitative studies would be hard, if not impossible. When only two or three persons are working within a certain field, surveying their responses in order to make statistics would be futile and hold little value. Quantitative studies may also be best suited for studying issues where the premises and causality are well known, in order to secure some validity and relevance of the findings. In this case, the issue at hand was still to be explored, with numerous surprises surfacing during the stays with IOSS.

Interviewing over telephone and e-mail will hardly be a perfect replacement of a face-to-face conversation, but due to the circumstances, this was the option that was eligible at the time. It would have been valuable to discuss things through, asking follow-up questions, and the like, but the research design has been altered to accommodate this as good as possible, i.e. some of the issues could also be explained by other interviewees. On the positive side, the fact that the two persons in question were onboard at the time, underlines their hands-on role with the delivery, their relevance as sources, and the fact that the successful completion of Island Wellserver is their main focus at the moment.

2.3 Relevance of Methodology
In attempting to classify the methodology applied by conventional standards of inductive and deductive, the picture may not seem altogether clear. The method should be considered closer to an inductive approach, even though it is not a textbook example of such. The purpose, for example, is not primarily to develop a new theory, which otherwise may be thought of as a distinctive mark of inductive research. In this study, the focus is on the practical case, and the theory primarily serves as a means, a frame for the analysis, and not a goal in itself. There is undoubtedly a deductive element in taking a body of theory and aligning it with the workings of IOSS. However, in this case, the theory will not lead to the development of a hypothesis to be tested by large-scale surveys and quantitative tools. Rather, the theories are an important
input for the questions that were posed in the regular interviews and informal conversations during the stay with IOSS, which more often is a tool of inductive research.

Having conducted this work in the form of a case study, it is evident that some aspects have benefited more than others, and that the chosen format is not necessarily the optimum alternative in all respects. In this project, the embedding with IOSS may cause a loss of objectivity, potentially compromising the validity of the analysis. However, the seeking of opinions from externals, at times in opposition to IOSS, will hopefully mitigate the potential for becoming biased in favour of IOSS. Furthermore, delving into the same level of detail with competitors would also have been a valuable contribution in many cases, providing examples of who does what more successful than the others. However, given the unique aspect of IOSS’ offering, directly comparing their work to competitors is not a feasible methodology, as those delivering comparable services do so under entirely different conditions and by other methods, not really providing grounds for meaningful comparisons for the purposes of this project.

The written sources produced by IOSS are of a diverse nature, and hold various qualities and relevancies for this study. The application for acknowledgement is meant for approbation by the petroleum safety authority, and is therefore rather prudent and instructive. The two presentations are informative, richly illustrated, and excellent at providing an introduction to IOSS’ work for a viewer with a basic knowledge of subsea technology. Considering their validity as sources, they are valuable for each their purpose. The application details onboard procedures, and is a key component of getting official approbation. Therefore, going outside these procedures would be a rather grave event, and might jeopardise the acknowledgement of operation, as well as raise questions from insurers and the like. This all goes to support that the application will be followed, and represents an accurate source, if somewhat technical. The two presentations should in no way be regarded as the complete picture, but are useful for understanding the concept. Especially the second presentation is valuable, as it incorporates a track record for Island Frontier’s work, and quantifies the increased expectations for Island Wellserver. Obviously, the two presentations will not reveal details on the setbacks and the challenges faced, which is information that must be actively sought after elsewhere.

Quantitative studies could have been relevant if the project went on continuously for a much longer time, tracing developments in the employees’ workload or sense of achievement over time. Alternatively, going into detail with the operability, HSEQ and IOR track records of
Island Wellserver could be a valuable quantitative input to a study taking place in two years or so. Currently, for these topics, one can only assume that once the Island Wellserver gets into regular operation, a favourable development will take place as the crew gains experience, and hiccups with the equipment are weeded out. Hopefully for IOSS, it will also happen at an accelerated pace compared to Island Frontier. A future quantitative study, investigating the first two seasons with Island Wellserver, compared to Island Frontier, could deliver a very valuable addition to the project at hand, clarifying and quantifying the consequences of the project management studied qualitatively in this study.

2.4 Academic Literature
The literature applied to this case is centred on projects, either taking a theoretical perspective, discussing the vital concepts for this study, or in the form of case studies of businesses conducting projects that somehow have a relevance to IOSS’ situation. There is numerous high quality scientific papers written within both fields, and so only a limited selection can be dealt with in any detail. Furthermore, certain scientific papers are included for their useful deliberations on concepts that are considered instrumental to the project, presenting a sound basis for the use of such key factors as knowledge, learning, and the like.

The purpose of looking at IOSS through a lens of scientific papers is to contrast the project management around the Island Wellserver with other projects somehow comparable, or to reach a deeper understanding of the processes that go on in IOSS.

Obviously, a project of this scale cannot, and should not, try to incorporate the vast body of applicable literature on the subjects. Instead, a relatively small selection is chosen, large enough to include the most important concepts and a fair selection of cases, but small enough for the reader to keep track of it throughout the study. The bulk of the chosen literature is scientific papers from reputable publications, and most of them less than 10 years old. When combined, these papers address numerous issues that relate directly to IOSS’ situation, and are easily applicable as a foundation for analysis. The relatively short papers are chosen because they tend to present a specific and concentrated, yet thorough argument for their position, referring exactly what preceding texts they oppose or depart from.
3 Background

3.1 Light Well Intervention
Subsea wells are often established in combination with existing, fixed installations, to optimise the production from a large and mature reservoir, where maximum oil recovery would otherwise not be feasible. Mature fields also tend to have wells where the production volumes have peaked, and these will need increased maintenance and intervention in order to keep producing profitably. It is easy to see that with the high cost levels of intervention from a drilling rig, intervention from a vessel offers a whole new landscape in terms of a breakeven analysis of whether or not to invest in an intervention campaign. However, the number of subsea wells globally is 3,000 and growing, and oil reservoirs are increasingly being developed entirely by the use of subsea installations, due to the advances in technology (Island Offshore Management).

In order to understand the establishment of IOSS, one must first know what alternatives existed for operators on the NCS at the time. LWI operations were performed mainly through risers, from semi-submersible drilling rigs, which were thought of as being unnecessarily large and expensive relative to the actual technical needs. Therefore, there was an expressed desire among oil companies to develop a LWI-solution employable from a self-propelled ship, thus moving a lot faster and cheaper than a rig in tow or under own power, and substituting anchoring operations with Dynamic Positioning (DP) (R. Friedberg, 2009). DP allows the satellite-controlled navigational equipment to take direct control over the advanced propulsion system, keeping a vessel on station with negligible horizontal movement despite the forces of wind and waves (Kongsberg Maritime, 2009). Ship-based LWI had been in operation since 1987 on the UK continental shelf, from the “Stena Seawell”, now “Seawell” (Helix Energy Solutions, 2008). However, due to stricter environmental standards on the NCS, the same services could not be performed with the available technology, though an exemption was granted for Statoil to use the vessel in 2000 (Tvedten, 2003).

The primary technical obstacle was the development of an approved stack, which can be thought of as an immensely complex valve located on the seabed, keeping the oil down in the well while allowing for passage of the wireline with tools connected to it. This means that in the absence of a riser, it must contain and neutralise a pressure from beneath of 690 bar, by injecting and circulating biodegradable grease into what is called a lubricator, with a minimum of the grease spilling out at the top and into the sea. The first stack for this specific
purpose that was allowed on the NCS, was developed in 2003, by subsea equipment manufacturer FMC, rig owner Prosafe, wireline operator Aker Kværner Well Services, funded by Statoil and a government initiative called demo 2000. The need for cheaper LWI services was well known, and the government decided to counteract a slump in the oil industry at the time, by sponsoring selected R&D projects. It was tried and tested, and after some setbacks and rounds of reconfiguration, Statoil used it to perform LWI services on one of their wells, from a Prosafe rig called “MSV Regalia”. However, it did not seem to be commercially attractive for Prosafe, and so the rig was reconfigured to perform other duties, and moved to Brazil. Hence, there was a proven well control package sitting idly, and a North Sea full of mature oil reservoirs in need of LWI services. Enter Island Offshore Subsea (R. Friedberg, 2009; G. Gravdal, 2009).

3.2 Island Offshore Subsea
The establishment of Island Offshore Subsea is a true product of a series of fortunate coincidences, involving technical, political and investment opportunities occurring simultaneously. Petroleum Geo Services (PGS) was one of the companies trying its hand at ship-based LWI, through a project under the management of Robert Friedberg. He had, during his work, developed rapport with the technical environment around the Ulstein shipyard, including the design engineers that had worked on what a ship for LWI might look like. Simultaneously, the Norwegian government announced that it intended to gradually end a program of subsidising the Norwegian shipyard industry, and so Ulstein had an incentive to maximise and accelerate their production to release the most subsidies. This resulted in the speculative building of two large offshore service vessels, of which one was sold to Solstad Offshore, which still operates it under the name of “Normand Flower”, and the other became “Island Frontier” (R. Friedberg, 2009).

A few years before, ownership of the Ulstein shipyard had been sold to English industrial company Vickers for a large cash payment, with which the Ulstein family had become passive investors in some of the ship owning companies along the Norwegian west coast. However, the Ulstein family became interested in establishing their own company, and turned their assets into what became Island Offshore in 2000, and Island Offshore Subsea in 2005. PGS, in the meantime, was cutting costs, and had told Robert Friedberg that they did not intend to continue the effort towards conducting ship-based LWI. Believing firmly that the concept was viable, and that the Ulstein family could be interested in ownership, Per Buset, Leif Hoemsnes and he left PGS and formed Island Offshore Subsea, starting work with Island
Frontier (R. Friedberg, 2009). It was generally acknowledged that in order to work with live wells, they would need a partner among the established Norwegian rig operators such as Smedvig or Odfjell, providing both an equity stake and the operational competence. However, at the time, the rig operators were reluctant to take on the investment, especially as rig rates were dire, and so they were unwilling to nurture a cheaper competitor to their own rigs. The only offer from the incumbents were to operate the vessels for a fee from IOSS, but this was out of the question, as the established rig owners had no incentive to ensure the well-being and attractive margins of IOSS.

3.3 Island Frontier

Island Frontier was delivered from the shipyard before the topside equipment was ready, and so for a short while, Island Frontier performed more conventional tasks for the oil business, not requiring a module handling tower or entry into live wells. However, after about a year, the alliance partners had their contributions ready, and IOSS could start to market their LWI-services. The immediate focus was getting the Island Frontier and the required equipment operational and approved, and in February 2005, Island Frontier was awarded a UK Safety Case, which is an official requirement for working on live wells on the UKCS. Following, IOSS performed their first LWI job on a well belonging to Chevron Texaco, which was successful in all respects, being safe, effective, and losing little time to weather conditions. The next two wells, belonging to Nexen, turned out to be a rather nerve-wracking affair. A series of challenges arose with the first job, after which IOSS feared that there was a very real chance of having to terminate the entire company. However, due to a lack of other available LWI providers at the time, IOSS was kept on to service the next well, which turned out to be a tremendous success that established IOSS’ name in the industry. The well intervention performed here was a re-perforation of a producing well, and increased the production volume by an astonishing 20%, resulting in a payback period for Nexen of only 10 days for both wells (R. Friedberg, 2009).

This result was most likely a weighty argument when Statoil shortly afterwards awarded IOSS a six-year contract for LWI-services, with a fixture for 150 days a year operative, with Statoil retaining the option of extending the contract by up to three years. This contract remains the largest well intervention contract awarded anywhere in the world. The value of the firm part of this contract is NOK 1.5 billion, translating into a daily rate for the vessel in operation of close to NOK 1.8 million. This figure, however, should only be perceived as an indicator, as it excludes the impact of options exercised, bonuses, waiting-on-weather,
mobilisation fees, and technical breakdowns. The 150 days are essentially the summer season, “summer” to be understood in a Norwegian sense of the word, in which the North Sea weather is more likely to permit subsea work. In addition, Statoil has the option of extending the contract by 100 days annually, effectively meaning directly before and after the summer season. Working on live wells from a vessel during winter seasons is unlikely, with wind speeds and wave heights below the safety limitations being the exception from the rule, and lasting only for a short while when occurring. The first two years of operation were to be handled by Island Frontier, while the Island Wellserver, scheduled to be completed in April 2008, was to take over thereafter, freeing Island Frontier to take on other assignments (Island Offshore Management, 2006a). This was a turning point for IOSS, allowing them to plan ahead in terms of predictable operations, expand with the backing of a steady cash flow, and establish a standing organisation offshore. Furthermore, the planning and delivery of Island Wellserver now had to be managed, followed shortly afterwards by another LWI-vessel, the Island Constructor, which was to enter a contract with BP on the UK Continental Shelf.

The first period of Island Frontier’s operation was marked by technical setbacks and a certain amount of trial and error. One component that required substantial rework, was the module handling tower, delivered by National Oilwell Varco (NOV). The heave compensation did not work fast enough for a ships’ movement pattern, being much more drastic than that of a rig, thus limiting the weather conditions under which Island Frontier could work. In addition to this, the stack from FMC required further attention and work-over before operating to expectations. The module handling tower from NOV is procured on regular terms by IOSS, limiting the incentive of NOV to exceed or reconsider their contractual obligations. FMC, however, is an alliance partner, requiring them to take active part in the preparation and operation of their equipment. The uneven balance of power between the start-up IOSS, and FMC, the global leader in this niche of subsea equipment, began to make itself felt at this introductory phase of operation. IOSS did not feel that FMC gave much priority to their operation, which for FMC as a total was a relatively minor activity, an attitude that was slowing the rate of progress towards optimal performance. In retrospect, project manager Per Buset (2009) feels that Statoil could, to a greater extent, have applied their leverage on FMC, given that they are an important customer of FMC on a global scale, with a better chance than IOSS at getting their way. Had Statoil exercised some influence on getting FMC to prioritise the rework of the stack for IOSS, Statoil would in turn have received a fully operational RLWI-vessel earlier.
What proved to be a procedural and repeated challenge, was to achieve the optimal integration across the alliance partners’ personnel, when operating simultaneously. Specifically, deficiencies in this respect caused the wireline operator and the ROV operator to be out of “sync”, not ready for the commencement of operations at the same time. This is an incident of great annoyance for IOSS, as it would be avoided if procedures were strictly adhered to, and should none the less have been spotted and rectified by the supervisor from IOSS. However, it remains an occasional problem, being a strong indicator of a sub-optimal integration onboard, whether it is caused by impractical procedures, limited training, or awkward layout of working stations and control facilities.

The first year of operation was thus a period of immense learning for IOSS and the alliance partners, both in technical developments and in the training of personnel with experience mainly from drilling rigs. Reaching the level of performance initially aimed for, took 15 months, which was much longer than anticipated, and this was especially due to the complex nature of the equipment making it time-consuming to modify (P. Buset, 2009). Breaking new ground in terms of technology, means that much of the reconfiguration was carried out onboard, fitting the equipment as they went along, seeing at once whether a new design was viable or not. While being a thorough process of quantifiable progress, and undoubtedly providing a unique learning opportunity for the personnel involved, pulling a vessel out of operation in order to modify equipment, will always be a costly and undesirable solution. The concept of “pioneering costs” springs to mind, conceiving certain costs for ground-breaking technology, while hoping that the bulk of the development costs will be non-recurring.

The track record for 2006 is illustrative of the progress in operability: 11 successful interventions were conducted, in which the operability on the first four jobs was 62,8%, compared to 82,4% on the last four, disregarding “waiting-on-weather” (R. Friedberg, 2007). Given that IOSS is paid according to time operational, it is obvious that such progress has a substantial cash-flow effect. The fine progress made with Island Frontier’s operability is clearly a product of the application of the experiences made, both internally and in the combined effort with alliance partners. However, being subject to various very strict legal codes, the potential for physically modifying the design of Island Frontier is severely limited. This largely limits the room for improvement to modifications in procedures, or to equipment that takes up equal or less space compared to its predecessor.
3.3.1 Application for Acknowledgement

In 2006, responding to increased relevance of vessels for work with live wells, the Norwegian petroleum safety authority extended a regulatory framework that had been in place for rigs, to also apply to vessels like those of IOSS. This is the reason why neither Island Frontier nor Island Wellserver is labelled a “ship”, or “boat” in this study. According to Norwegian regulation, they are not ships, but “Ship-Shaped Well Intervention Units”, which in particular impacts regulations on design, and the compensation system applicable to the crew (Island Offshore Management). Any vessel to work on live wells containing hydrocarbons (essentially oil and/or natural gas), had to apply for an “Acknowledgement of Compliance” in Norwegian: “Samsvarsuttalelse”, or SUT, requiring an extensive process of quality management by the affected shipowners (Petroleum Safety Authority, 2006). The application for a SUT details the unit’s design, construction, and capabilities, and goes further into the owner’s procedures, onshore organisation, quality and safety management system, and training procedures. IOSS was the first company to receive a SUT for a well intervention vessel, allowing Island Frontier to work on the Norwegian sector.

The work leading up to the receipt of this approbation, was challenging, yet rewarding, for IOSS, as detailed instructions for the onboard operations had to be made, and numerous possibilities had to be thought through. Statoil contributed to this work, applying their vast experience with drilling contractors on the Norwegian sector, as they had their own interest in getting Island Frontier operational as soon as possible. It was during the work with the SUT that IOSS concluded that they needed to formalise the approach to quality management further, prompting them to acquire the Antenor Management System. Another output was the adding of a designated safety officer to the regular crew, supervising work offshore while interfacing with the person onshore responsible for health, safety, environment & quality (HSEQ) (P. Buset, 2009).

3.4 Technology

Light well intervention is one of the technologies within the field of increased oil recovery, IOR. As has been touched upon, light well interventions, such as wireline operations, have traditionally been performed from the deck of a semi-submersible drilling rig, which is moved to the relevant well, and connected to its subsea installations. Unless the rig is self-propelled, it requires towing the drilling rigs to location, deploying perhaps eight anchors, and retrieving them after the LWI has taken place, and the rig can be towed to the next job. Thus, the rig operator must employ several of the titans in the world of seaborne power, the anchor
handling tugs, for which daily rates for rig moves in e.g. October 2008 averaged £123.011, at times peaking substantially higher (Seabrokers Group, 2009b). The expensive and dangerous work of anchorhandling, employs three or four such vessels for a few days, weather permitting, until the rig is ready to be towed to the next location. Adding to the cost of the operation, is the increased difficulty of anchoring in the North Sea, due to the now extensive infrastructure of pipelines and subsea installations, excluding any type of anchoring in their vicinity. However, there are more important drawbacks to the conventional operations from drilling rigs than the costs. It places personnel in a number of potentially dangerous operations, specifically lifting operations of heavy modules on the deck of the rig, personnel working aloft in the derrick, and on the UKCS; divers assisting in the operation at the seabed. All of these activities can, and do, cause serious injuries or death, and turned out to be avoidable, given the correct equipment and procedures.

3.4.1 The Advances of Island Offshore Subsea
The novel features of Island Offshore Subsea’s technology can be grouped in three categories: The use of an “off the shelf” single-hull design, the operation of wireline without going through a riser, and the improvements in personnel safety, due to increasingly automated operations.

The designers of offshore service vessels tend to develop a range of fairly general designs, depending on the primary role they are going to have, and then equip and adapt the ships according to the specific requests of the shipowners (Ulstein Group, 2006). They are either intended for carrying cargo to offshore installations (Platform Supply Vessel), towing and anchorhandling of rigs (AnchorHandling Tug Supply), or advanced subsea work, e.g. pipelines or wellheads (Offshore Construction Vessel). Both the Island Frontier and the Island Wellserver are clearly designed for the construction role, being comparatively large, with helicopter deck, great lifting capacities, client offices, as well as accommodating 72 and 97 persons on board, respectively. Another feature that is both typical and critical for a state-of-the-art offshore construction vessel, is the moonpool, which is essentially a vertical opening located amidships, running from the working deck and down through the hull. While the vessel is transiting between jobs, the moonpool is sealed off by hydraulic doors, and is opened once on station and ready to commence work. Having a sheltered access to the sea, allows for working also under adverse weather conditions, deploying or retrieving expensive and sensitive tools for subsea work, while avoiding the swell at the ship’s sides. In the case of “Frontier” and “Wellserver”, the moonpool is roughly quadratic, measuring about 7x7 metres,
and located directly beneath the module handling tower. The module handling tower is replacing the derrick onboard a drilling rig, and in order to neutralise sudden wave motion, the wireline winch operating through it is actively heave-compensated. Island Frontier and Island Wellserver are denominated as UT 737 and UT 767, respectively, with UT referring to the designers in Ulstein, owned by Rolls Royce Marine. Both designs incorporate rather conventional hulls, with the UT 767 being substantially larger:

<table>
<thead>
<tr>
<th></th>
<th>Island Frontier</th>
<th>Island Wellserver</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length over all:</strong></td>
<td>106,2 m</td>
<td>116,0 m</td>
</tr>
<tr>
<td><strong>Breadth:</strong></td>
<td>21 m</td>
<td>25 m</td>
</tr>
<tr>
<td><strong>Deadweight:</strong></td>
<td>4.700 t</td>
<td>8.500 t</td>
</tr>
</tbody>
</table>


What is commonly referred to as “wireline”, is the practice of using a thin wire, sometimes electrical wire, to carry a tool into a well. There can be a variety of tools at the end of the wire, such as instruments measuring temperature or pressure, directional explosive charges to re-perforate a well, or plugs to block a section of a well that is causing problems, such as seepage of water or sand. The conventional method of getting a wireline into a well is through the riser, where the drilling pipe otherwise would be. From a fixed installation, or a drilling rig, this is fairly straight-forward and routine work. A subsea well, however, has no such riser, effectively ruling out this option. The technology applied by Island Offshore Subsea involves deploying a remote operated vehicle (ROV) to the wellhead at the seabed, to install the well control package that is required for the entry of the wireline. Thereafter, the remaining components of the stack are prepared in the module handling tower, lowered and attached to the well control package, with the wireline connected to the top end. During deployment, the wireline is paid out from a designated winch, in parallel with the regular lifting winches that are lowering the stack. Once inside the well, it can be moved to the location that is planned to
receive an intervention by means of gravity, or a motorised unit called a “tractor”, if the well deflects by more than 67 degrees. The fact that the operation is conducted without a riser, has also coined the term that Island Offshore Subsea most often use: Riserless Well Intervention, RLWI (Island Offshore Management).

The extensive use of ROV’s is one of the key progresses in terms of keeping personnel out of harms’ way. The operations going on at the seabed are traditionally the domain of divers, which still is the way it works in many parts of the world. However, deep-sea diving in the oil industry is deeply controversial in Norway, with scores of disabled divers telling their own war stories, and those of their colleagues who died on the job. However, deep-sea diving remains common on the UKCS despite well-documented and appalling figures on injuries, as well as disability and suicides among ex-divers (Lossius, 2003). Regardless of the reasons, the use of ROV’s is becoming ever more widespread, and there is no indication that IOSS has ever considered using divers for their operations.

Regarding work at altitudes, the operations onboard the vessels can be conducted without personnel climbing around in the module handling tower, wearing safety harnesses. This is a marked improvement from the rigs, where the work aloft is an integral part of the operation, with the inherent risk it involves for the personnel. Finally, an intervention campaign requires numerous heavy objects to be moved to and from the location where the equipment is assembled and lowered, or hoisted and disassembled, which typically is solved by lifting them with a crane. However, onboard a rig, there are many obstacles to free movement, and the crane operator may not have a sufficient overview at all times and to all angles. This is likely to be one of the causes for why lifting operations is a “usual suspect” within offshore accidents involving serious injuries to personnel (Petroleum Safety Authority, 2006c). It is easy to imagine that this risk is greatly increased on the confined quarters of a vessel’s deck, being rather cramped with various containers and modules. Furthermore, a vessel’s movement is both faster and a lot larger than that of a rig, which is likely to give a crane operator and the deck personnel surprises of the hair-raising kind.

IOSS’ response to these challenges is the implementation of a skidding system on the relevant sections of the main deck, namely from the sections where the various modules are stored, and to the tower where they are coupled and lowered through the moonpool. Equipment is
thus traversed horizontally across the deck loaded on special pallets, and into the module handling tower, both obtained from NOV:\(^1\):

The use of such skidding rails, powered by hydraulics, greatly decreases the need for outright lifting over deck, with the associated risks. In sum, IOSS have made great progress in personnel safety, which is underlined by the fact that Island Frontier has a track record of HSEQ that Island Offshore takes great pride in, and is striving for among the rest of their fleet (P. Buset, 2009). In fact, Island Frontier was in operation for two years without a single injury to personnel, making it the best vessel in the North Sea in this respect (F. Hansen, 2009).

3.5 Working in an Alliance

The organisation around Island Frontier is being replicated with the next vessels, and consists of a team from an alliance of companies, essentially a joint venture, each delivering the service in which they are specialised. Island Offshore Management owns and manages the vessels, and is also responsible for keeping the maritime crew for regular maintenance and operation. Aker Kværner Well Services delivers the wireline equipment, as well as the required personnel for its maintenance and operation. FMC Technologies delivers, maintains and operates the well control package and related items. Oceaneering, operating and maintaining the ROV’s, is not considered an alliance partner, as they are brought in on regular procurement terms, and have more of an assisting role in the LWI. Finally, IOSS have a

\(^1\) Picture is taken onboard Island Frontier, and shows the moonpool, the skidding rails, and the lower structure of the module handling tower. (R. Friedberg, 2006)
coordinating role, in terms of general project management, as well as in the continuous operations offshore (See figure (R. Friedberg, 2007). IOSS is thus also responsible for ensuring the smooth integration of the partners’ activities, in turn requiring a substantial effort in ensuring a flawless interface between the partners’ equipment, which is a continuous process from the planning stage and onwards. IOSS also coordinates joint training and familiarisation programs on the equipment for all relevant personnel, across the organisational boundaries, ensuring that all are well versed with the hardware, the operations, and the onboard safety procedures (training advisor Lars F. Monsen, 2009, pers. comm. February 5th). Regarding the division of work, IOSS and FMC are bearing the brunt of the pioneering costs, being the developers of novel technology, and facing the initial setbacks. For AKWS and Oceaneering, the work is pretty close to “business as usual”, and not particularly influenced by the fact that it is taking place from a single-hull vessel instead of a semi-submersible rig (P. Buset, 2009). National Oilwell Varco (NOV) is a crucial element in the whole operation, despite the fact that they take no part in the alliance. NOV supplies the module handling tower and the skidding system, without which no intervention tool could be run down the moonpool. NOV, like Oceaneering, supplies to IOSS, who in turn does the interfacing of the equipment and Island Offshore Management’s vessels.

The intention of the alliance structure is for a small company like IOSS to be able to offer a client a comprehensive, all-inclusive service, without having to build the necessary capabilities in-house. Furthermore, it is thought that a single point of contact is perceived as more attractive by the client, simplifying the procurement process, compared to having to deal with a myriad of suppliers, each evading the contract in seven different ways. The single point of contact in this case is IOSS, which then takes on a substantial risk of subcontractors not performing. One of IOSS’ tasks is thus to manage the alliance in a way that ensures a uniform
presentation and performance from the alliance partners, handling any conflicts between them before it emerges as a problem for the client or jeopardises the alliance’s functionality. The contracts call for a certain number of days operative annually, and if the vessel is not fully operative, IOSS will not get paid. If the inability to work is due to inclement weather, with wind speeds or wave heights exceeding the pre-set safety limitations, IOSS is paid a reduced rate (commonly referred to as “waiting on weather”). The alliance partners are paid according to an agreed distribution model, depending on the investment they have made in the project. The alliance is thus a rather vulnerable construction, because if just one of the partners’ equipment is down, the work as a whole must be suspended until the repairs are completed, thus no payments at all are made from Statoil (R. Friedberg, 2009). The financial loss for IOSS from a technical breakdown can, according to contracts, not be passed on to the specific alliance partner, effectively limiting their downside in the investment to their own loss of income (F. Hansen, 2009).

3.6 The Client
Statoil is the state-controlled oil company in Norway, dominant in the North Sea, and by far the largest company on the Oslo stock exchange, with a market value as of March 2009 exceeding that of the next 10 companies combined (Oslo Børs, 2009a). They offered the initial, six-year contract to IOSS, which was to be performed by Island Frontier first, and then to be taken over by Island Wellserver upon delivery. However, due to the success of Island Frontier, the contract was extended, so that “Frontier” would keep on working for Statoil also when the Island Wellserver was operational. Statoil is considered to be a constructive and positive client in most respects, taking a helpful approach to the cooperation and cultivating a healthy relationship. This is no doubt further improved by the fact that managing director of IOSS, Robert Friedberg himself has a past in Statoil, and so is well acquainted with both their culture and way of operating. Perhaps surprisingly, Statoil has more employees working with the daily follow-up of LWI-operations than IOSS, numbering about 25-30 (R. Friedberg, 2009). On a general note, they have also shown an interest in technical progress, taking a productive approach to IOSS, and working along, also with uncertain and innovative efforts, in order to achieve improved performance (K. Nygård, 2009). A fact pointed out by project manager Geir Gravdal (2009) from Statoil was that they are serious about achieving technical progress at their subcontractors, exemplified by their funding in the demo 2000 program, developing the first stack approved on the NCS. The contracts themselves require little attention, as it is built on simple, well-known, and standardised Norwegian industrial
contracts, and the cooperation is discussed and followed up continuously. While there have been numerous amendments, or “variation orders” to the contract for Island Frontier, they have been paid for by Statoil, whenever it has exceeded the requirements on IOSS called for in the original text (F. Hansen, 2009).
4 Current Issues
Moving on to the more current issues that IOSS has to deal with, it is interesting to consider what steps are being taken to face the present and arising challenges. After taking a look at the more recent developments of significance to IOSS, the internal workings can be dealt with. Firstly, IOSS has pursued an active policy regarding human resources, in order to tackle a massive escalation of operations. The planning and delivery of Island Wellserver has been a grand task for IOSS, and so the management of this work will be described extensively in the next sections. Furthermore, the contributions of the alliance partners, as well as the role played by the client, Statoil, will be presented. Finally, the general outlook for IOSS will be discussed, looking at the technical and commercial events that are likely to play a role in the near future.

4.1 Recent Developments in the Industry
While the large oil companies that hold the licences to produce oil from designated reservoirs may be thought of as simply maintaining continuous operation, projects are the main focus of many actors in the surrounding industries. Operating an oil field entails numerous efforts in modifying and replacing critical equipment, expanding the subsea infrastructure, and improving the performance through an increased level of oil recovery. Much of this work is delegated to external contractors. One example is the large, globally operating subsea engineering company Acergy, which works and organises itself primarily through projects, continuously adapting itself to the needs of the current portfolio (Acergy, 2009).

By coincidence, the challenge of reaping the most benefits has recently become a timely issue in the business of oil services, that is, the large and diverse group of subcontractors to the oil companies, such as IOSS. The relevance of the issue is being prompted by the near-collapse in the oil prices, with monthly average prices of Brent Crude dropping by a stunning 69% from July 08 ($135.28 per bbl) to December 08 ($42.61 per bbl) (Seabrokers Group, 2009a). Consequently, the margins have all but disappeared, making oil companies pressure their regular suppliers for cost cuts (Teknisk Ukeblad, 2009). Therefore, the companies able to develop competencies and abilities at the lowest costs are at a substantial competitive advantage in times like these. Differentiation, in this case developing unique skills, can be thought of as a method of easing cost pressures and price comparison, and may assist a subcontractor in retaining attractive margins and profitability of investments.
Investments within oil service often become more or less relevant with the fluctuations in the oil price. Looking further back than the slump presented above, one can see that a barrel of Brent Blend was trading at $9.90 in the beginning of 1999 (Statistics Norway, 2007). The implications for payback periods are colossal, and the 1366% price increase in the 10-year period to follow meant that certain new options became commercially viable. Examples include offshore drilling in arctic waters at extreme depths, or the refining of Canadian oil-containing sand. These are methods of oil production that only become profitable at the high price levels of the last few years, certain oil-sand projects requiring prices upward of $80 to be profitable (Dagens Næringsliv, 2008). In more moderate terms, projects within the conventional exploration and production of oil in the North Sea also have limits as to whether they will be carried out, should the oil price fall below a certain level. At the time of writing, several projects requiring prices in the region of $45-$60 are being put on hold, awaiting the future price developments (Stavanger Aftenblad, 2009a). Applied to light well intervention, the oil companies may not be keen on investing too heavily in maintaining or stimulating a well if the additional oil produced is barely paying for the regular operating costs of an old and complex installation.

4.2 Human Resources
Considering the management of human resources, the delay in the delivery of Island Wellserver has had its positive aspects. Firstly, IOSS is dependent on recruiting skilled energy professionals in a, until recently, hotly contested market. Having more time to attract and select the right team thus lowers the pressure on IOSS. Secondly, it has allowed IOSS to temporarily place some of those recruited for Island Wellserver and Island Constructor onboard Island Frontier, to some extent “doubling up” certain positions onboard. Having future key personnel gaining experience as Assistant Superintendents or Junior Supervisors, or establishing night shifts, has been a constructive and helpful way of steadily building competent crews (I. Gravelsæter, 2009, pers. comm. February 5th). In addition to extensive on-the-job training, some of the supernumerary personnel functions as a key link between the offshore and onshore environments. Under a regular working schedule on the NCS, each offshore position employs three individuals, spending two weeks working offshore, and four weeks of leave. However, IOSS has chosen to operate with four superintendents for Island Frontier, all spending nine months per year on a regular offshore rotation, and the remaining three months in the offices of IOSS and Statoil, assisting in the daily back-office follow-up (P. Buset, 2009). This way, one achieves greater integration and communication between two
“camps” that otherwise may develop different cultures, as the superintendent can combine extensive operational flair with the knowledge of procedures onshore. Conversely, some of those working onshore in following up the operations, also spend time onboard the vessels on occasion, in order to gain more hands-on experience to complement their academic backgrounds (I. Gravelsæter, 2009, pers. comm. February 5th).

IOSS is definitely scaling up their human resources according to the future needs, with the “Wellserver” and the “Constructor” about to enter operation. From January 2008, and until March 2009, the total number of employees; offshore, onshore and hired consultants combined, grew by 88%, from 50 to 94. The emphasis on training crews for the coming vessels is reflected in the fact that the offshore staffs is the group that has seen the largest growth, from 22 to 46, divided on all the positions in the offshore hierarchy (I. Gravelsæter, 2009).

The combination of permanent employees and consultants hired temporarily is a consequence of a deliberate policy by IOSS. While the permanent staffs are taking care of the continuous operations and emergency preparedness, most of the consultants have designated roles within new technologies or product development. This leaves IOSS freer to place more or less resources into the various activities, according to the preferences of themselves and their client at any given time. On the downside, IOSS exposes itself to substantial risk by letting numerous external consultants deal with new, possibly sensitive technologies that may be crucial in creating or maintaining a competitive edge. This is addressed by stern contractual obligations of non-disclosure on the part of the consultants, combined with access restrictions
on what technical information and documentation is available for who on the company network (F. Hansen, 2009).

### 4.3 Island Wellserver

The need for the vessel that would become Island Wellserver, was firmly established upon agreeing Island Frontier’s long term contract with Statoil. Island Frontier, already operational at the time, was to be the “frontrunner”, and be replaced by Island Wellserver as of April 1\textsuperscript{st}, 2008, releasing Island Frontier for new tasks. The specific design of the Island Wellserver was decided by IOSS, who presented a vessel of capabilities that fulfilled the specifications Statoil had demanded, and seemingly had a good chance of exceeding the performance of Island Frontier (G. Gravdal, 2009). Island Frontier was in operation on the UKCS at the time, and offered limited potential for adaptation to the specific preferences of Statoil.

The fine progress made with Island Frontier’s operability is clearly a product of the application of the experiences made, both internally and in the combined effort with alliance partners. However, being subject to various very strict legal codes, the potential for physically modifying the design of Island Frontier is severely limited. This largely limits the room for improvement to modifications in procedures, or to equipment that takes up equal or less space compared to its predecessor. The experiences made with Island Frontier, own and partners’ equipment, have numerous tangible consequences for the final design of Island Wellserver, being purpose built for fairly well-known operational demands. All the superintendents from Island Frontier have contributed to varying degrees in the planning and building of Island Wellserver, ensuring an inflow of operative experience. However, the alliance partners’ employees and offshore staff have not been involved to the same degree (I. Gravelsæter, pers. comm. February 5\textsuperscript{th}).

The one improvement that immediately catches the eye, is the difference in sheer size. “Wellserver” is longer, wider, heavier, and has much more free deck space. The increased dimensions will make it sturdier in rough weather, which has proven to be the main obstacle for Island Frontier’s operability. This is also reflected in the expectations on sea-keeping abilities, and less time spent “waiting on weather”. While the Island Frontier is able to perform wireline operations in wave heights of up to five metres significant, and wind speeds of 18 m/s, Island Wellserver keeps working until there is six metres and 20.3 m/s, respectively (R. Friedberg, 2006). Applied to predominant weather conditions on Haltenbanken in the Norwegian Sea, this is calculated to transfer into an operability for Island Frontier of 66%,
compared to 84.7% for Island Wellserver (R. Friedberg, 2007). The intentions from Statoil’s part are also adjusted to this fact: With the Island Wellserver ready for work, it will primarily be used in the Norwegian Sea, where wave conditions are often worse than in the North Sea, and the wells generally require frequent rework and servicing. Island Frontier will then be kept mostly in the North Sea, thus getting the most intervention work out of its more limited sea-keeping abilities (Offshore.no, 2009). As already mentioned, a major obstacle in getting Island Frontier to a satisfactory level of operability, was adapting the heave compensation to a ship’s movement pattern. According to FMC, this was a key learning point in their delivery to Island Wellserver, and made them alter their design to achieve greater heave compensation of the umbilical cable (G.S. Kleppe, 2009).

The increase in deck space from 945 m² to 1150 m² allows more deck load and greater flexibility of use, in the case of further modifications to equipment for existing and new tasks (R. Friedberg, 2006, 2007). The interior has also seen substantial changes, drawing on the experiences made, in order to offer a state of the art working environment and comfort. Island Wellserver is prepared for jobs demanding a large number of personnel from clients or alliance partners, having 97 single cabins, a cinema, larger meeting rooms, designated offices for the alliance partners and a larger operations room (Island Offshore Management, 2008a). This is intended to increase the integration between the alliance partners, allowing for a more seamless operation. The joint control facility located in the module handling tower, allows for greater overview and control of the critical stages of operations, unlike with the internal location the facility has onboard Island Frontier. Hopefully, this will assist in avoiding the repeated mishaps from Island Frontier, of wireline and ROV operators not cooperating perfectly.

The control facility is one example of a feature that was not specified in the original layout that Statoil committed themselves to, but was added in response to IOSS’ suggestion (G. Gravdal, 2009). Thus, one might say that it is a tangible example of transferring knowledge from the operation of Island Frontier to the design of Island Wellserver. Renegotiating contracts is usually not the most appealing of options, but the situation IOSS found themselves in made it sensible for Statoil to be willing to consider new suggestions. At the time of signing the contract, both parties had limited experience with vessel-based LWI, in itself suggesting that concepts and ideas could be altered, turned down, or developed in the years until planned delivery of the “Wellserver”. In sum, the innovations and the technology earned Island Wellserver the prestigious title of “Ship of the year 2008” (Offshore.no, 2008).
Island Wellserver also needs a SUT to be able to work on the Norwegian sector, which again was a thorough process of quality management for IOSS. The actual application was filed by IOSS on January 4th, 2009, and is an evolved version of the document used for Island Frontier. The petroleum safety authority considered the application while also carrying out actual inspections onboard Island Wellserver, to see the equipment and procedures being put to work. Following, the acknowledgement of operation was awarded to Island Wellserver on April 3rd, followed shortly after by a consent for Statoil to use the ”Wellserver” for light well intervention on certain fields (Petroleum Safety Authority 2009a/b). After an intense period of mobilisation on the CCB-base just outside Bergen, Island Wellserver finally left for the “Tordis”-field on April 24th, for its first operative well intervention (Offshore.no, 2009).

Statoil has become very pleased with the performance of Island Frontier during 2008, which no doubt sets a standard for Island Wellserver. In fact, achieving an improved operability, in time surpassing Island Frontier, was a prerequisite in the main contract that was awarded for Island Wellserver. However, the contract also explicitly allows for a certain amount of trial and error during the first year of operation, acknowledging the pioneering nature of much of the equipment (G. Gravdal, 2009). During 2008, 14 light well interventions were completed for Statoil by Island Frontier, 11 of which took place during four months, indicative of the importance of favourable summer weather. According to Statoil, performing light well interventions from Island Frontier has proven 50-70% cheaper than renting a semi-submersible rig to do the same service, and even the most time-consuming and challenging job of 2008 turned out to have been performed cheaper by Island Frontier than what working from a rig would have cost (Offshore.no, 2009). Another factor increasing the demand for RLWI-services overall, is the fact that there is a lower break-even point when performing interventions on pure subsea wells, as they have lower operating costs than a conventional installation. This, combined with the increase in the number of subsea wells, serves to indicate that demand for RLWI will remain strong.

4.4 Project Management in the Delivery of Island Wellserver
Island Wellserver, being a costly and complex undertaking, has seen its fair share of delays, and finally entered operation slightly over year later than initially scheduled. The steelwork and initial planning with the alliance partners took place simultaneously with the immensely hectic initiation phase of Island Frontier, competing for the attention of the few employees at the time. While the vessel itself was delivered practically on schedule, the topside equipment turned out to be a whole other story. Much of the delay revolves around FMC Technologies,
their new stack, combining it with the storage facilities onboard, and NOV’s module handling equipment. The stack is a new and innovative design, “Mk II”, and intended to work at depths down to 3000 metres, compared to 600 metres for the “Mk I” stack presently in operation with Island Frontier. While the “Mk I” stack for Island Frontier was ready before the ship was built, the “Mk II” stack was still being designed while Island Wellserver was well into building.

“The Mk II is absolutely cutting edge, nothing like it has ever been built before. This requires product development, and getting these things to develop in sync is not easy.”

(R. Friedberg, 2009)

While undoubtedly a challenging task, FMC produced a stack that initially did not fit into its allocated hangar on the deck of Island Wellserver, causing a week of extra steelwork for the yard, and extra work and expenses for design and classification. Additionally, the design of the well control package’s connection to the well has been altered, contrary to IOSS’ intentions, which in itself limits the stack from communicating with some of Statoil’s wells (K. Nygård, 2009). Consequently, IOSS has had to take delivery of a connecting module from Multicontrol, not originally planned for or budgeted with, in order to be able to work on all of Statoil’s wells on the NCS (T. Halvorsen, 2009).

4.4.1 Interfacing with Alliance Partners

Tommy Halvorsen joined IOSS in December 2007, and was quickly assigned to work with the interface of the alliance partner’s deliveries to Island Wellserver, as he had previous experience of direct relevance to this task. After getting acquainted with the situation, he was deeply worried when seeing what he considered to be insufficient documentation and specification of deliverable components, suggesting that the preparatory work had not been sufficiently thorough from IOSS’ part (T. Halvorsen, 2009). In retrospect, it seems that much of the work around the delivery of Island Wellserver has not been conducted by individuals dedicated solely to this single project in the form of a team, but rather dealt with to the best of abilities by people already busy with other tasks within IOSS. His opinion is that in general, a well done interface job is not noticed and appreciated sufficiently, the level of success being fundamentally hard to quantify or point out. However, if e.g. budget pressures cause a lack of resources for a thorough interface job, the consequences are felt after delivery, in terms of HSEQ incidents or sub-optimal performance. These issues are then likely to be blamed on
unforeseen incidents or operator mistakes, rather than tracing the causes back to an insufficient effort on interfacing at a much earlier stage.

The prevalent philosophy for physical and operative completion of Island Wellserver, was to copy the procedures of Island Frontier extensively, given that it was approved and operational in every way. However, according to interface coordinator Tommy Halvorsen (2009), there was an insufficient attention given to the fact that the stack is of a new make (Mk II) onboard the Island Wellserver, influencing the module handling tower and the skidding system, requiring substantial reconsideration of procedures. Furthermore, because the topside equipment onboard Island Frontier was extensively modified “on the go” in between the first intervention campaigns, at times with little documentation, reaping experiences and synergies from this process proved to be challenging. Adding to the technical issues, was the fact that the procedures in place for Island Frontier were deemed to be of a somewhat general nature, relying extensively on the experience of the personnel for the safe and effective conduct of a well intervention. This point of view is in line with project manager Per Buset’s (2009) statement that the Petroleum Safety Authority was “kind” when awarding the SUT for Island Frontier, the first ever awarded to a well intervention vessel. He admits that the management system for Island Frontier at the time was reasonably good, but not at the level they would have liked it, or, in fact, did reach during the subsequent period of operation. For Island Wellserver, there should be an improvement, driven by higher and more evolved expectations from the Petroleum Safety Authority, but more so rising internal ambitions for quality and safety. The final testing phase for Island Wellserver before commencing work, taking place on a dummy subsea well located inshore, requires extensive development and specification of procedures. If these procedures had been developed in great detail at an earlier stage of the project, it is more likely that mismatching interfaces between stack and module handling equipment would have been identified at the planning stage, reducing the cost and time of having to alter designs, etc (T. Halvorsen, 2009).

IOSS has seemingly taken a somewhat reactive approach to their alliance partners’ work, assuming that FMC and NOV have been sufficiently active in configuring their deliveries, and that both would fit Island Wellserver upon delivery. This turned out not to be the case, for which IOSS has been paying dearly. The work that has been going on at FMC and NOV is marked by insufficient participation by operative personnel from IOSS, and insufficient inter-organisational integration (T. Halvorsen, 2009). Had IOSS been more present at the clients during planning and design, utilising operative personnel in providing inputs based on current
experience, the control with the delivery and the output would probably have been tighter than was the case, requiring less patchwork and reworking afterwards. A factor that is likely to have played a role in this regard, is the geographical location of the suppliers. While FMC is located in Asker, close to Oslo, NOV is located in Kristiansand at the southern tip of Norway, IOM is located at the northwest coast near Ålesund, and IOSS is supposed to oversee them from their location near Stavanger. Paying a visit to anyone of these would thus take the better part of a day even if going by plane, which is quite likely to have played a role for the level of hands-on participation in each other’s activities. A specific example of insufficient operative input, as well as coordination between suppliers, is getting the necessary access to the stack while it is being handled in the tower. During trials, it became clear that there needed to be more access platforms welded to the tower to allow the crew to work on the stack in a safe and easy manner while hoisted, requiring additional unforeseen rework for IOSS and NOV.

The requirements for FMC’s equipment were established in a joint study taking place after the ordering of “Wellserver” and “Constructor”, and included IOSS representatives (G. S. Kleppe, 2009). The input from FMC confirms that the cooperation was somewhat marked by insufficient follow-up and communication, in turn causing delays and reworking on their deliveries. Specifically, a major obstacle for a timely delivery was that Island Wellserver and the module handling tower from NOV were ready well before FMC’s equipment, leaving FMC to work within specified frames to meet the interfaces. A consequence thereof, pointed out by FMC’s Geir Ståle Kleppe (2009), is that the “head start” by NOV made it difficult for FMC to exercise much influence on the design of the tower, due to fears of delays and cost overruns at NOV. However, he also acknowledges that the delivery was in the far reaches of both FMC’s and IOSS’s capabilities, in terms of available resources and technology, which in turn impacted the effectiveness and duration of the process negatively. For FMC, it resulted in an insufficient knowledge of certain practical issues during the initiation phase, such as the delivery times of certain components, and the need for a tight supervision of their suppliers. Nevertheless, FMC and IOSS are now operating a uniquely innovative stack, setting them and their capabilities ahead in the industry. Certain components from the “Mk II” stack have also been applied to the “Mk I” onboard Island Frontier, displaying a somehow “reversed” flow of experiences and knowledge (T. Halvorsen, 2009).
4.4.2 Client Involvement

The contract in itself stipulates a low level of involvement for Statoil’s part, in line with IOSS’ intentions with the alliance structure. Statoil set up a project on their side, for the thorough follow up on the delivery, and established routines and internal milestones for their work, also making their procedure available for IOSS. As already established, project manager Geir Gravdal was responsible from Statoil’s part for the delivery phase, his responsibility ending when the vessel is declared operative. He is thus working to serve an internal client in Statoil, which is the Stavanger office of the Statoil business unit called “Drilling & Well”. Above him in the hierarchy is a steering committee, dealing with the more overriding contractual issues, etc, but only getting directly involved when required. This makes him the single point of contact from Statoil to IOSS regarding this project and the specific technical and procedural issues, following up the actual and potential challenges that may arise. One such area that was identified by Statoil at an early stage as holding potential for delays and trouble, was exactly the “Mk II” stack from FMC Technologies, being such a bold leap in capabilities. Consequently, from July 2008, Statoil kept a near-permanent presence at FMC until January 2009, supervising tightly their work and progress. This was clearly exceeding their contractual obligations, and was an expenditure not planned for. However, it was considered by Statoil to be an unfortunate necessity at the time, to ensure faster progress, given that the stack, and the vessel, initially was planned to have been operative in April 2008 (G. Gravdal, 2009).

Statoil does, however, appear to be interested in the continued technological development of the equipment, also after the Island Wellserver is operational, and the delivery project as such is wrapped up. At the commencement of contract, the head of Statoil’s Drilling & Well department, Øivin Jensen, announced a few specific technical ambitions for Island Wellserver, adding that those activities probably had a year or so of development remaining (Offshore.no, 2009).

4.5 The Future Market for RLWI

IOSS has such unwavering belief in the design of Island Wellserver, UT 767, that on July 15th, 2008, it ordered a second vessel of the same design, only 14 metres longer overall, and with increased engine and propulsion capacities (Island Offshore, 2008b). However, the construction has been put on hold until further notice, because the vessel was not ordered to a firm contract, and in times like these, another great cash expenditure is not the most attractive of options. Upon the delivery of Island Wellserver, Statoil also stated that they now had their
demand for LWI-services covered, with the contracted services from “Frontier” and “Wellserver”, indicating little demand for a third vessel from their part (Offshore.no, 2009). Given Statoil’s dominant role, this information indicates that the market on the NCS is about to be saturated, regardless of the supplier.

Interface coordinator Tommy Halvorsen (2009), in his work with the interface of suppliers’ and alliance partners’ equipment, is inclined towards larger vessels with more available space on deck, reducing the need for rework and compromising that is necessary. In his view, there is not given quite enough emphasis to the fact that onboard the Island Wellserver, there will be various newly developed equipment, which tends to be substantially larger than the forthcoming, more refined versions. It is interesting to consider this opinion against the fact that Norwegian oil and industrial company Aker Solutions is preparing to enter the business of ship-based LWI, in partnership with District Offshore (DOF), a large and very experienced owner and operator of offshore service vessels. Their contracts so far call for two vessels, of 120 and 160 metres length over all, with 6200 and 11500 tonnes deadweight. Furthermore, there are options for three more of the larger model, which exceeds both the “Wellserver” and the next UT 767 in terms of size (See comparison of Island Wellserver and Skandi “tbn” from Aker/DOF below, (Aker Oilfield Services, May 8th, 2008).

The first and smallest vessel enters a contract upon delivery, while the next vessel, along with the three other vessels for which there are options, still need fixtures. These are to be owned mainly by newly established Aker Oilfield Services, with minority ownership and maritime management by DOF Subsea, a subsidiary within DOF that specialises in subsea engineering (DOF Subsea Group, 2007). The press release stipulates that intervention work on the vast depths of the Brazilian shelf will be a vital part of the activity, placing very high demands on equipment and crew. A noteworthy fact is that Aker Solutions currently has a market value of
over NOK 10 billions (Oslo Børs, 2009b), and that DOF manages a fleet of 70 offshore vessels of varying type (DOF ASA, 2009). Consequently, the invested parties in the new entrant seem to have some substantial weight to throw around, far more than the IOM/IOSS constellation, should it be necessary. However, it must be emphasised that Aker Oilfield Services does not have an operative intervention unit yet, so the real effectiveness of their effort remains to be seen. Neither has DOF experience with managing ship-shaped well intervention units, as opposed to ships, so there are surely unforeseen obstacles yet to be handled. Tommy Halvorsen’s (2009) rough guess is that IOSS currently is two years ahead of the competition, in terms of operative technology. However, he fears that this head start may be lost soon, should the obstacles encountered with Island Wellserver become symptomatic for the company.

Another entrant to the RLWI-market, is Marine Subsea, which has more in common with the IOSS/IOM constellation. Though information on this entrant is scarce, it emerges that they have contracted IOM as a maritime operator of the two vessels; “Sarah” and “Karianne”, but IOM is to take no ownership in the enterprise. Both vessels are of the same design as IOM’s Island Constructor, known as “SX 121” (see figure (Marine Subsea, 2007) and deliverable in July 2009 and October 2010, respectively. The vessels are built specifically to service long contracts with Sonangol, the Angolan government’s oil company, on the ultra-deep Angolan continental shelf (Vikebladet, 2007). The influence on the demand for IOSS’ activities in their regular markets should therefore be modest.

4.6 The Outlook for IOSS
Looking ahead, IOSS is facing a number of critical decisions on the path to follow onwards. If the schedule for new deliveries holds, the time period from 2008 until end of 2011 will be one of immense growth in activity for IOSS, moving from one operative well intervention vessel, to three vessels and one rig, with one vessel on hold. Being able to replicate a well-proven offshore organisation, as well as effective back-office support, will be a great advantage for IOSS. The fact that IOSS will be in a position to recuperate past R&D spending from the
revenues of four operative well intervention units is likely to contribute positively to profitability, as will any occurrences of economies of scale and scope. Furthermore, the similarity in design and equipment of Island Frontier, Island Wellserver, and the future UT 767, suggests a potential for learning economics at many levels. The crew supplied by Island Offshore Management and IOSS will be of similar size and composition, requiring similar competences, thus enabling benefits in terms of effective training and interoperability between vessels. The similarities also ease the back-office work of technical follow-up, through dealing with fewer suppliers, simplifying and cutting costs on procurement of a limited range of well-known and proven components.

There is also an important aspect with the regulatory framework, with IOSS and alliance partners becoming increasingly versed with the specificities of the applicable official regulation, and that of the classification agency, DNV. This also applies to the designers and the outfitting shipyard, Aker Langsten, who can stick with what they know, reducing the risk of unforeseen problems or delays. It may also further cement the alliance, as the partners become more and more familiar with each other’s equipment, and the vessels’ capabilities and construction, avoiding mishaps like the odd-sized well control package from FMC. Another example of a shipowner apparently going to great lengths in seeking these benefits is Maersk Supply Services of Denmark. They are now in the process of taking delivery of ten identical anchorhandlers, built and equipped by the same shipyard (Maersk Supply Service, 2008). Even though these anchorhandlers are less complex and innovative than a RLWI-vessel, it goes to support the assumed advances of sticking to “off the shelf” designs and equipment, especially when it is done by such an experienced shipowner. On the downstream-side, vessel of similar and well-proven capabilities can be a strong selling point, and offers flexibility to the fleet management, allowing several vessels to fulfil the same contractual obligations. Should Aker Oilfield Services choose to exercise their options, similar gains will be available, if they have the ability to grasp and utilise it.

IOSS is currently working on the possibility of performing a drilling technique called “coiled tubing” from their vessels, starting with Island Constructor. Coiled tubing is an advanced form of drilling, allowing for greater flexibility and accuracy in directional drilling. Compared to conventional drilling with rigid pipe, where the rotational movement is powered from a “top-drive” onboard the rig, coiled tubing is a great leap forward. With coiled tubing, the drill pipe is really a flexible tube, lowered from a winch (hence “coiled”), and the rotational power for drilling is developed down at the drill bit itself. Having this option available from the
vessels would expand IOSS’ capabilities, and further dispossess drilling rigs from the intervention business, given that IOSS can replicate their competitive advantage from RLWI. The technology of coiled tubing is in itself well-proven and an operational method of medium well intervention, but IOSS has some obstacles to overcome before it can be successfully implemented without a riser, and from a single-hull vessel.

In addition to organic growth, IOSS is also exploring technological possibilities being developed externally. The first and only acquisition so far is MaxPERF of Alberta, Canada, which has developed a new technology, Penedrill, for drilling perpendicular perforations in existing wells, fitting neatly into IOSS’ business of advanced servicing of producing wells. This is now owned by a group of companies in the sphere of the Ulstein family, with IOSS having a 10% ownership stake, as well as being assigned the management. So far, the perforation technology is only being utilised from rigs, and qualifies as heavy well intervention, effectively ruling out the possibility of deploying it from vessels without the use of a riser. However, it is the expressed ambition of IOSS to develop the technology until perforation can be conducted from wireline, making it a form of light well intervention, and employable from the existing vessels (project manager Leif Hoemsnes, 2009, pers. comm. March 27th).

Looking back on the challenges met and overcome so far with Island Frontier and Island Wellserver, managing director Robert Friedberg remarked that ideally speaking, the other members of the alliance should start their work two years before IOM, in order to have a very evolved concept at the time of building the actual vessel (R. Friedberg, 2009). Alternatively, the alliance should not take form until the whole concept was functioning and ready to enter operation. The mutual dependency during the planning and building, combined with the need for a constructive long-term partnership, is a major impediment compared to having the influence that one would command in a conventional supplier-client relationship. This wish, although unrealistic, is no doubt shaped by the obstacles and costs encountered with both vessels in getting the equipment fully functional and optimally integrated, and the knowledge that modifications are immensely cheaper if they can be confined to drawings, rather than requiring steelwork. IOSS’ focus will no doubt change in the near future, when Island Wellserver and Island Constructor operate satisfactorily, freeing resources for other tasks. The delivery of Island Innovator, the drilling rig, is drawing nearer, requiring more attention when the outfitting takes place. However, IOSS recently withdrew job advertisements for certain key positions, as the building had not advanced to a stage where it was necessary to
strengthen the organisation (I. Gravelsæter, 2009, pers. comm. February 5th). With the next vessel put on hold, IOSS has some flexibility in whether to pursue contracts and commence building, or whether to wait until more is learned from the experiences with Island Wellserver and the general market outlook and competitive landscape.
5 Analysis
After considering the issues raised throughout the narrative, combined with the research questions and theoretical focus presented in the introductory part, the stage is set for applying and discussing these inputs in an analytical section. Firstly, some observations regarding IOSS and Statoil will be presented, extracted from the available empirics. These observations depart from the preceding empirical section by combining several issues to form overriding assessments, while not entering onto a theoretical discussion. Thereafter, the major obstacles that IOSS has met on their way, internal and external, will be the subject of a broad discussion in light of the presented academic literature. This section will make up the bulk of the analysis, have a discussing form, and assist in evaluating the level of success in overcoming the arising challenges. Following, there will a brief summary of the main findings, according to the research questions and the needs of the forthcoming conclusion. Proceeding, both the theoretical and the practical implications from the case study can be gauged. The theoretical implications will include a discussion of what the findings from the case tell about the applied theories, their validity, limitations and applicability. The section on practical implications will use the findings to evaluate what the consequences are for IOSS, and what awaits them in the near future, based on their performance until this point.

5.1 Observations
5.1.1 “A Bridge too Far”
IOSS committed themselves to supply Statoil with a purpose-built new build, Island Wellserver, when entering the contract with Island Frontier. Looking back, the effort that went into getting Island Frontier operational has drained the organisation of resources that were much needed in the early planning and building of Island Wellserver. IOSS was very much an entrepreneurial organisation at the time, and given that it took 15 months of improvement to get Island Frontier to perform to expectations, the early phases of work on Island Wellserver seems not to have gotten sufficient attention. This is based on the observable problems with interfacing, requiring rework of the hangar onboard, the tower from NOV, and the additional connecting module for the well control package. Although IOSS did not know what challenges lay ahead of them at the time of entering contract, it is prudent to assume that innovative technology operating in waters notorious for wearing down structures, was bound to face obstacles and setbacks.
Furthermore, the fact that NOV and FMC did not manage to coordinate their deliveries sufficiently, may not be IOSS’ fault, but dealing with it remains their managerial plight. Ideally, IOSS should have discovered the lack of communication in the initial phases, before the problems materialised, with the backup option of pushing for a tighter cooperation when the first signs of hiccups emerged, well before installation. Operating in an alliance remains a complex undertaking, requiring the leader of the alliance to closely monitor the partners and take heed.

5.1.2 “Caveat Emptor”
Statoil has undoubtedly taken on an active role, perhaps more than one would envisage when it is IOSS that is to render the services. The assistance with developing procedures for Island Frontier, as well as monitoring FMC’s work on the stack for Island Wellserver, seems to exceed their contractual obligations. However, Statoil, given their vast experience with cutting-edge technology and niche suppliers, must have known that both projects were prone to delays and obstacles, especially due to the mammoth task that this fledgling had taken on. This understanding is reflected in the fact that Statoil divided the contracts in 150 days firm pr. year, with options for more, as well as the 6+3 year duration. The inherent flexibility for Statoil in this contractual structure, suggests a desire to be able to adjust the contract according to actual performance of IOSS in terms of Increased Oil Recovery and HSEQ. Furthermore, the clause that IOSS will only get paid in full as long as the vessels are operative, is instrumental in reducing the downside for Statoil. It can thus be concluded that Statoil was willing to take on a limited amount of uncertainty, and work actively towards a mutually beneficial outcome. However, Statoil’s apparent congeniality must be weighed against the fact that IOSS was the only available provider of ship-based LWI at the time, and so it was more a question of “whether” rather than “who”.

Statoil’s direct involvement can also be motivated by a desire to be present at the forefront of development, and an acknowledgement of the value of gaining such competence. No matter the supplier, Statoil will have a substantial need for well intervention services in the foreseeable future, and as such have every reason to be as well versed with all its aspects as possible. The motivation for aiding in getting the vessels operational may therefore both consist of the immediate need for LWI from IOSS, as well as the long-term need for competence within procurement of such services. Furthermore, the more Statoil gets to specialise IOSS’ equipment to their own needs, the stronger Statoil will be in a future renegotiation of contracts, achieving a “lock-in” effect. This can place IOSS in an
unfavourable position, serving Statoil despite diminishing margins, because adapting their operation to other clients entails a new round of pioneering costs. However, it should be pointed out that so far, the cooperation has been amicable, and IOSS has not observed any indication of such “sharp practices” from Statoil.

5.2 Discussion

5.2.1 “A Plan is Nothing – Planning is Everything”

While facing and overcoming challenges are a sure-fire way of producing knowledge among those involved, IOSS does not seem to have reaped the maximum potential benefits from the process with maximising Island Frontier’s operability. Kotnour (1999, 2000) advises the project manager to focus on learning both during and after a project, from both within and outside the organisation. His empirical evidence (2000) suggests that companies focusing on such learning achieve commercial success both with the project at hand, as well as in the forthcoming projects. IOSS seems to have been too swamped in work with Island Frontier to be able to look ahead and extract much learning for future benefit, partly a consequence of the unpredictable nature of the work, successively overcoming challenges as they arose. With the delivery of Island Wellserver, there does not seem to have been a firm project management taking on such an overriding responsibility from the beginning, given the strained capacity of IOSS at the time.

The lack of available, applicable and codified experiences from Island Frontier’s process, contributed negatively to the delay of Island Wellserver, especially regarding the integration of alliance partners. These obstacles became a major impediment for interface coordinator Tommy Halvorsen, who upon joining IOSS requested whatever documentation that was available from the analogous process with Island Frontier, as well as operational procedures. Given that the volume and specificity of what he found gave every reason for concern, it seems evident that IOSS had missed a chance of developing knowledge and distributing information internally. The old quote that “those who cannot learn from history are doomed to repeat it”, springs to mind immediately. Had IOSS given priority to a disciplined development of procedures in the very early phases of delivery, it is likely that problems with interfacing equipment of different origins could have been identified and weeded out at a stage where fixing them would be relatively cheap. This would also have been a profound learning experience for everyone involved, equipping them to better handle the obstacles that are bound to emerge at a later stage. A timely effort in producing documentation and
developing procedures could have reduced the obstacles currently faced, while the lagging effort that actually did take place will be fully appreciated when the next vessel is to be built and equipped.

Disterer (2002) has made a highly applicable study into reaping knowledge from projects, for which the relevance follows the same line of reasoning as Kotnour’s studies. While the increasingly popular organising through projects tends to create hurdles for effective knowledge sharing, Disterer found that making accessible project closure reports with assigned contact persons was beneficial in two ways: Firstly; it contributed to an increased knowledge sharing between the different projects, as well as between project teams and the core organisation, and secondly; it was useful in incorporating new personnel into the organisation. Both these benefits are of the utmost importance to IOSS, given the scale and complexity of the projects they are running, the urgency surrounding much of their work, and the rapidly growing organisation, consisting of a mixture of permanent and temporary employees. Had comprehensive and applicable project closure reports from Island Frontier been available for the delivery of Island Wellserver, the contributions from new employees could have been accelerated. If the ongoing processes with “Wellserver” and “Constructor” are sufficiently documented, IOSS in turn may be more agile in handling the next big projects. Of particular importance are a thorough and honest documentation of any errors committed during the work, why they arose and how they were solved.

The study by Coakes, Bradburn and Blake (2005) on the benefits of effective knowledge sharing in a UK construction company also holds some interesting revelations. The key findings were that learning through knowledge sharing, made possible by internal webs and a receptive organisational culture, was an effective alleviator of the financial risk in construction projects, and that learning could be made tangible and demonstrated for clients. IOSS certainly has an interest in achieving the improved quality and reduction in defects that was found at the case company, and be able to document this kind of learning and progress for prospective clients. Good and improving HSEQ statistics would be a particularly strong selling point, and could be a crucial selling point in securing a contract for the RLWI-vessel that is currently put on hold. Taking into account that the alliance partners are dispersed across southern Norway, a functional and vibrant internal web for all parties should be a priority of IOSS, thereby tackling the very real problems arising from working apart.
The geographical dispersion of alliance partners has been presented and discussed, but there is a highly interesting parallel to be drawn from Enberg, Lindkvist and Tell’s case study on knowledge integration within a team working on new product development (2006). Enberg et al. argue that physical collocation need not be a prerequisite for effective communication, if certain other conditions are met: Frequency of similar tasks, goal homogeneity and a common understanding of the task at hand. While IOSS and the alliance certainly were dispersed across Norway, there seems to have been little fulfilment of the mentioned conditions. The work was of a unique and novel nature, with alliance partners delivering each their component, according to an insufficiently specified plan. This goes to suggest that the benefits identified in Enberg et al.’s case company could not easily be realised in this instance, and so the alliance would have needed to articulate and codify their work further to ensure a beneficial level of knowledge transfer.

5.2.2 Maintaining Relevance

There are several texts advocating an augmented view on the evaluation of a project’s success, and reconsidering which factors may be considered and emphasised. Atkinson (1999) departs from the iron triangle, and suggests also including the effects on the information system, the organisation, and the stakeholders, when evaluating a project. The intention is to avoid committing the type II errors that may arise due to an excessive focus on avoiding type I errors. Kreiner’s (1995) argumentation is in line with this view, warning the initiators of a project against freezing the specifications at a too early stage of the process. By mitigating the forces of “environmental drift” through such early spec-freeze, the relevance of the end product may be jeopardised. Roberts (2007) seems to agree with this philosophy when discussing the tasks of a project manager; emphasising the importance of ensuring a shared sense of vision and direction among all stakeholders, rather than strict adherence to preset guidelines.

IOSS needs to be sensitive to the desires of the market and the rapidly evolving technological opportunities at the time of delivery, due to the high costs and long expected service life of a RLWI unit, also if this means risking the timely delivery on budget of Island Wellserver. The main advantage of sticking to the presumption of drifting environments is the resistance against losing relevancy due to time and cost pressures. Competitive entries or pressure from the client could otherwise spark an unsound spec freeze at a too early point in the process, rushing the remaining work. The active participation of Statoil suggests that they are in understanding with the need for flexibility and tolerance for environmental drift throughout
the process, and take a key interest in ensuring the final relevance of the services they are procuring. Generally speaking, it is fair to assume that the client’s flexibility towards the supplier increases with the duration of a contract, and the value of the services, as moderate cost overruns or delayed deliveries become more worthwhile if the pay-off is years of improved performance. The philosophy presented by Kreiner (1995) thus seems to be present, more or less intentionally, at both IOSS and Statoil. Atkinson’s (1999) expanded view on project assessment can also be recognised, particularly when looking at the potential for long-term benefits at both own organisations and among stakeholders. The overarching, guiding functions of the project manager, as described by Roberts (2007), is less visible at IOSS. Most notably because the delivery of Island Wellserver was not handled as a free-standing project by a dedicated team, but rather as a part of the company’s regular work.

5.2.3 Modularity
Another interesting perspective is that of modularity, as explained by Ron Sanchez (2000). The relevance of modularity is a consequence of IOSS’ policy of retaining the alliance partners and the suppliers, and striving for similarities in the design of the vessels. The unintuitive step of applying a philosophy typically associated with assembly line production, onto large, complex industrial projects, has been discussed and endorsed in the designated part of the introduction, and will not be repeated here. In its purest form, applied to an operational setting, modularity could allow IOSS and the alliance partners to quickly circulate the components necessary for the work at hand among the vessels, according to the most current needs, or in response to seasonal activity patterns and technical breakdowns. This would contribute in reducing the inherent risk for IOSS in the alliance structure, in which IOSS is hit hard, financially, if one of the alliance partners’ deliveries is not operational. Though an attractive situation to be in for IOSS, it may seem a little utopian at the moment, becoming more realistic when the components for LWI become more standardised, with fewer surprises in the delivery phase. Striving for the qualities of modularity could also have a beneficial effect on the crewing and onboard familiarisation, in line with learning economics; the more standardised and interchangeable the equipment becomes, the easier it will be to circulate personnel among the vessels.

Paying attention to the underlying philosophy of modularity could nevertheless be a very useful exercise for IOSS’ future technological undertakings. The implementation of modularity would require a very firm project management from IOSS’ part, in order to establish the common interface everyone would be using as their template in the further
product development and production. Needless to say, the mismatching between FMC’s and NOV’s equipment experienced with Island Wellserver, with the subsequent rework, has no place among those who practice modularity, and is likely to hamper any future reconfiguration of the onboard equipment of “Wellserver” and “Frontier”. If modularity is applied throughout in a disciplined manner by the alliance partners, new and improved components could be developed independently and installed on board the vessels, causing a minimum of adaptation and reengineering.

However, a quest for the advantages of modularity may run head-on against the advice of Kreiner (1995) discussed in the previous section, advocating flexibility throughout a project in order to maximise the relevance of the end product. Atkinsons’ (1999) work further strengthens this line of thinking, in seeking the greater good of all stakeholders in the long term. This point of view receives yet further relevance in face of the typically long-term contracts awarded for LWI work so far. Modularity is based on an early and very detailed spec-freeze, leaving no room for adjusting to “environmental drift” during production. The innovative and experimental phase IOSS has found itself in has probably favoured a flexible approach to the delivery of Island Wellserver so far, judging from the amendments to contracts and the extensive reengineering that has taken place. However, at a later stage, with an increasingly established industry and technology, the environments may not appear as drifting any longer, instead favouring standardisation and timely deliveries.

5.2.4 Managing the Alliance
Extending the analysis to the functioning of the alliance, certain findings also raise interesting parallels in the academic literature. The alliance is at once a collection of cutting-edge, complementary competences, as well as a rather fragile construction, uniting different parties that ultimately have their individual commercial goals. The concept of supplier integration in new product development, as studied by Petersen, Handfield and Ragatz (2005), is clearly relevant for IOSS and the work with Island Wellserver. The fact that FMC perceived that NOV was off to a head start, and that FMC felt that they were adapting their equipment to NOV’s, suggests that the supplier integration was less profound and broad than it could have been. Petersen et al., found that the key element of supplier integration was an early involvement in the decision making around the design, resulting in increased technical performance, and thereby commercial benefits. Consequently, had FMC been actively involved at an earlier stage, including simulation of the interfaces, it is likely that the mismatches would have been identified earlier, to the benefit of IOSS and Island Wellserver.
The reasons for FMC’s lagging entry relative to NOV remain unclear. It may be argued that IOSS has an incentive to seek cost-reductions primarily at NOV, allowing them to establish the design and interfaces according to what is cheaper for them to produce. This could be motivated by the fact that NOV sells their product to IOSS on regular terms, while FMC is an alliance partner that carries their own costs. An early freeze of specifications at NOV may thereby be a cost-saver for IOSS in the short run, by shifting the costs and work of redesign onto FMC.

Whether or not FMC’s delayed entry is a consequence of a deliberate policy pursued by IOSS, it carries some inherent risks. Beyond the study by Peterson et. al, (2005) suggesting that IOSS may forego the commercial benefits of a timely supplier integration, Atkinson (1999) and Kreiner (1995) provide related and valuable thoughts on the relevance of a project’s outcome. Kreiner’s drifting environments have everything to do with IOSS’ ability to ensure that the deliveries from the alliance partners are as updated as they can be. If FMC is relegated to adapting their stack to NOV’s existing tower and skidding rails, technical progress may be sacrificed in favour of compromises for interfacing, as well as time and budget pressures. Had both NOV and FMC held their specifications open as long as possible, in respect of drifting environments, an even more functional Island Wellserver could have been achieved. Atkinson advises towards a reconsideration of a project’s success criteria, which applies to IOSS in the sense that they perhaps should have more focus on the future benefits for alliance partners and client, and less on their internal project metrics, for the ultimate success of everyone involved.

5.2.5 Cooperation with the Client
A fine example of tight cooperation experienced by IOSS, is the continuous follow-up of Island Frontier’s operations together with Statoil. The close connection this creates has been valuable in continuously sorting out whatever issues arise, and incorporate the necessary amendments to the initial contract. Applied to Island Wellserver, suggested added features like the control facility in the tower would probably have been less appealing to Statoil, and a harder sell, if there had not been a trustful and close relationship. The physical presence of IOSS offshore personnel at Statoil’s facilities is likely to set the stage for the future achievement of the knowledge integration Enberg et. al. (2006) prescribes: There is homogeneity between the goals of IOSS and Statoil in this work, a common understanding of the tasks, and the back-office follow-up work of operations is of a repetitive nature.
Statoil has also displayed an interesting shift of approach from Island Frontier to Island Wellserver. While they stuck to a rather hands-off approach in the delivery of Island Frontier, exemplified by the passivity in using their leverage on FMC, their involvement with Island Wellserver has been more proactive. Identifying the Mk II stack as a component that requires tight supervision, and the following presence at FMC’s production facility, suggests that Statoil applied some experiences from the first project with IOSS and the alliance, in order to perform better in this second encounter. This is fully in line with the benefits from intra-project learning identified by Kotnour (2000), improving project performance. It is a fair assumption that Statoil is able to draw from their vast experience with subcontractors of cutting-edge technology, becoming adept at supervising and assisting with deliveries that carry some uncertainty. The presence of intra-project learning described by Kotnour (1999, 2000) thus should not only be sought within the boundaries of the company delivering the end product, but also among other stakeholders, perhaps particularly in the event of serial or parallel contact between the parties. Consequently, the client, the alliance partners and the shipyard are places where one could reasonably expect to find a presence of such learning, further cementing the cooperation.

5.3 Summary
Summarising the key findings from the preceding pages, with a view to the relevance for the research questions initially posed, will hopefully provide a useful foundation before moving on to the theoretical and practical implications and the conclusion. The summary follows the structure of the preceding analysis, and thus deals with the following four topics: Learning in and between projects, timing of spec freeze, alliance management, and the role of the client.

It is clear that IOSS and its alliance partners have had a challenging path towards getting Island Wellserver delivered and operational. Much of this centres around getting FMC’s stack ready and fully integrated with the relevant components onboard, which has been a frustrating and time-consuming process. However, the obstacles overcome should be a prime source of learning for the entire organisation on many levels, of which benefits should be extracted for the forthcoming projects. Regarding the application of experiences and knowledge, one could say that the dispersed locations of the alliance members have produced obstacles to traditional learning like that found in Kotnour (1999, 2000). However, learning to work under such uncertain conditions is a competence in its own right, and may be a key impact on IOSS’ capabilities from the delivery process. Another impact is the increased awareness around the cost of foregoing the learning opportunities, not reaping the benefits from learning identified
by Disterer (2002) and Coakes et al. (2005) in their studies of projects. IOSS’ rapid growth and diversification only serves to underscore the importance and urgency of this topic further.

At what time and point to freeze the specifications of the various components, is an issue that IOSS has been forced to deal with for the last two years, as discussed throughout the study. When considering the management of Island Wellserver’s delivery, it emerges that IOSS has first and foremost maintained the relevance and the capabilities of the final product, although this came at a cost. On the other hand, IOM and NOV have effectively instituted an early spec freeze, of which NOV have given FMC the presented challenges in adapting their stack to the handling equipment. Looking onwards, this experience is likely to provide IOSS with an awareness of what might be the right mode of project management in given situations. The principles and benefits of modularity, whose implementation probably were unrealistic in the present process, may come to play a role in the near future, with more competitive pressure, established technologies and maturing industries.

Moving on to the more operational issues of alliance management, it is clear that working in an alliance while running a joint combined delivery has been challenging, perhaps more so than what a conventional supplier/customer relationship would have been. The fact that FMC was one step behind during much of the delivery, is an indication that IOSS and the alliance have not been able to harvest the benefits from a timely supplier integration, like described by Petersen et al. (2005). Taking delivery of the tower from NOV before FMC’s stack was ready, may also have been counterproductive, somewhat limiting FMC’s design opportunities.

Regarding the delivery’s impact on IOSS, a delivery from an alliance highlights the discussion by Atkinson (1999) regarding from which stakeholder success is evaluated, and how to emphasise the long-term benefits. These are all learning points that may well influence IOSS in future projects conducted through partnerships. The experience made regarding timing of alliance partners, as well as the general ups and downs of working in this particular constellation is also knowledge that will come in handy when working with the next projects.

The client’s involvement with the management of the delivery has seemingly been substantial and thorough, particularly in the follow-up of FMC. Some of this effort can probably be contributed to the experience with Island Frontier, and its challenges in reaching a satisfactory level of operations. Any achievements Statoil may have had in accelerating FMC’s delivery, is also to IOSS’ and the alliance’s benefit, as they will receive an operational vessel that enters contract earlier. Considering the impact on IOSS of the client’s involvement, the
consequences fall into three categories: Firstly; the benefits from having Statoil perform a meticulous supervision, a task that otherwise could fall on IOSS. Secondly; observing Statoil’s work with FMC, and their general project follow-up, may be a source of learning for IOSS, improving their future project management skills. Thirdly; the influence Statoil has gained through this follow-up may cause a lock-in effect for IOSS, but also for the members of the alliance, first and foremost honing their skills in performing RLWI services for Statoil.

5.4 Theoretical Implications
Through applying each of the theories in a practical setting, numerous views on their applicability and validity develop. Some of the theories discussed in the analysis seem to be accurate and uncontested by the factual findings, while others present a more complex and nuanced picture. The work by Petersen et al. (2005) on the advantages of integrating suppliers at an early stage of new product development is relevant for IOSS, although it was not present in the cooperation with FMC. In fact, absence of this early integration has led to the exact problems that Petersen et al. sought to mitigate, and so one might say that the theory is confirmed by the occurring challenges with technical performance and commercial setbacks.

The implications for Disterer’s (2002) text are fairly similar: The challenges in retrieving knowledge from the work with Island Frontier can, to some extent, be attributed to insufficient effort in the project closure, not producing applicable knowledge for the ones facing similar obstacles in the future. This goes squarely against the advice of Disterer (2002) presented earlier, emphasising project closure reports with assigned contact persons as a way to permeate the internal borders that otherwise obstruct effective companywide knowledge sharing and evaluation of errors committed. Yet another set of texts for which the results are comparable, are Kotnour’s (1999, 2000) work on learning. While it is clearly relevant for IOSS in a general sense, the findings of the case seemingly do not offer any distinct theoretical implications for Kotnour’s work. This is largely based on the fact that the presence of learning, and thus its effect, seems to have been limited. Kotnour (2000) finds a positive correlation between learning in project teams and the project performance, but the findings from IOSS offer little basis for analysis regarding the validity of Kotnour’s findings. However, such an analysis inside IOSS can be an interesting foundation for a later study, especially in the wake of a future project in which the experiences made with Island Wellserver are put to good use in a planned manner.
5.4.1 Learning
The text from Enberg et al. (2006) has been applied to evaluate the consequences of IOSS and the alliance running a geographically dispersed product development. Enberg et al. postulates that knowledge integration and effective teamwork can take place despite predominately working under physical separation. They also advocate maintaining a dynamic, rather than static, approach to knowledge, suggesting that it is constantly developing, thus favouring a continuous knowledge sharing. Regarding the theoretical implications, the case at hand suggests that the occurrence of knowledge integration without physical interaction has been more challenging than what their study found. Despite the alliance being a community of specialists with a common goal, the communication turned out to be sub-optimal, with the well-known consequences. However, they explicitly and admittedly base their conclusion on a set of factors only partly present in the case studied in this study. Specifically, their case company’s new product development displays high task homogeneity and frequency, as well as high causal ambiguity/knowledge complexity, particulars they find to allow for the iterative model of knowledge integration.

However, in the case present, the task homogeneity and frequency differs by being low, due to the project’s unique nature. With the causal ambiguity/knowledge complexity remaining high, this should advent for articulation and codification as the main knowledge integration mechanism, according to Enberg et al. The insufficient codification of knowledge in the early phases of Island Wellserver’s delivery, and the consequences thereof, can be considered as supporting the theory by pointing out the importance of applying the relevant knowledge integration mechanism according to a project’s characteristics. The importance of the recommended dynamic approach to knowledge is supported by the findings in this case, in which IOSS has been forced to remain flexible towards inputs throughout the process, that is, take the “flow” rather than the “stock” approach. However, given the surprisingly little amount of discussion this has been given in the paper, it is hard to provide any further evaluation about its validity.

5.4.2 Modularity and Flexibility
The practical implications of the rivalling philosophies of modularity and flexibility have been discussed extensively throughout the analysis, and suggest that the theories deserve some further deliberation. Modularity is no doubt an immensely interesting concept for those engaged in large-scale production in which the end product consists of well-known components. The success of the end product is completely dependent on the ability of the
producer to present an exhaustive specification of the interfaces of the inputs. Failure at this step thwarts the entire effort, according to theory. Applying a concept from mass production onto a complex project has its limitations, as has previously been discussed. However, with borders and separation between continuous operations and projects softening, the discussion is still relevant in its own right, and concepts originally intended for the one may well be interesting for the other.

At the other extreme, Kreiner (1995) introduces the notion of drifting environments, and the potentially counterproductive consequences of an early spec freeze. This concept clearly has its merits, as felt by IOSS, and should be recognised and respected when encountered. While undoubtedly an issue of importance for some, others can be rather confident of the relevance of their end product, at least in the short term. Atkinson (1999) also seems to be concurring with this line of thinking, when arguing against what he perceives as the overly simplistic view of projects and their quality, as manifested in the “iron triangle”. This case is a strong indication that quality really is an elusive concept, and to gauge it accurately during planning and construction is unrealistic. Concluding, one can make the claim that Kreiner and Atkinson are adept and precise in describing projects that take place under shifting and volatile environments, and should be considered and applied accordingly. However, under static circumstances with steady progress, and predictable quality and usefulness of end products, their precautions may seem somewhat off-mark and unnecessary. It is exactly under such conditions that modularity becomes more appealing, skipping the comprehensive deliberations for the sake of time and cost pressures, and jumping straight to an end product of firm specifications. While both views are meaningful and relevant in this case, it becomes apparent that the two have each their area of applicability, corresponding with the phase the industry finds itself in. Kreiner and Atkinson offer the most useful policies for innovative projects of substantial uncertainty, like the one that Island Wellserver turned out to be. However, with the occurrence of a more mature market, with more established standards and predictable functionality, the relevance of modularity will most certainly increase. Interestingly, this will also be the conditions under which the iron triangle will seem to be the most valid and applicable description of the situation.

5.4.3 Projects vs. Strategy
Projects are typically thought of as having a predefined business justification, thus making projects the practical consequence of a strategy pursued by an entity, in line with Robert’s (2007) work presented in the introduction. While it is intuitive that a strategy will get outlets
in the form of projects, the case study at hand makes it worth questioning whether the relation can be more complex than that.

IOSS took delivery of Island Frontier based on the confidence that the technology was sufficiently evolved to allow for a commercially viable strategy of conducting RLWI jobs on the NCS. After signing the contract with Statoil, committing themselves to acquiring a second vessel, a fruitful relationship began, spurring innovation, improved performance, and extended capabilities. The ambitions that are being pursued for the new vessels, deploying e.g. coiled tubing or Penedrill, are a far cry from the services that Island Frontier was originally intended for. This evolving strategy is clearly a product of several factors, especially the improved technology available from the suppliers, and the growing operational skills among the IOSS and alliance crew. Both are developing as people make experiences, and so it seems that a company’s overall strategy might as well grow gradually out of the knowledge produced through projects performed.

5.5 Practical Implications

5.5.1 Choice of Strategy

Over the next few years, IOSS is facing an increasingly complex industry, finding their place among several competitors and technical challengers. Internally, focus will be shifted from breaking technological ground to maintaining steady operations from several vessels while staying on the forefront of the development.

Tommy Halvorsen points to larger vessels as the way forward, a strategy partly being pursued by Aker and their leviathans of 11500 tonnes. This seems to have its advantages in achieving flexibility of use, room for redesign, and avoiding the cramped compromises that may be a necessity with vessels like Island Frontier. Larger and heavier vessels are also likely to offer improved sea-keeping capabilities, given they are sufficiently powered, extending their tolerance for adverse weather while working on a well. However, increased size of vessels will undeniably push building and operation costs upwards, through increased consumption, larger crews, and fewer yards and harbours available to service it. At some point, this will be challenging the very “raison d’être” of single-hull RLWI vessels, an issue becoming ever more pressing with oil prices remaining comparatively low. Given that IOSS has had some time to move down the learning curve, it is the ability to work swift, safe and cheap with their moderately sized vessels that are their advantage against their larger rival, and the best deterrent of further market entries. This competitive strength may be furthered if learning
economics are realised to its full extent in the future, particularly through building and operating similar vessels.

5.5.2 External Involvements
If IOSS intends to acquire more technology providers in order to expand the range of services they are able to offer from their vessels, a consistent and productive approach is required. Considering the obstacles encountered in getting all components operational and cooperating onboard Island Wellserver, it is evident that any future suppliers must be scrutinised carefully for their ability to deliver a product that functions together with the relevant existing equipment. Otherwise, such investments would merely be diversification without a purpose, for which IOSS certainly has no need. In dealing with future suppliers with which to develop combined solutions, IOSS could benefit from combining their past experience of alliance management with the theory on supplier integration by Petersen et al. (2005). In doing so, IOSS would select partners that seem to match in terms of culture, and include them at an early stage of new product development, jointly developing technical target performances, thereby working towards the foundations of modularity. Alternatively, at a more mature stage of the industry’s development, the potential for modularity could be of interest, vetting candidates for acquisition by their track record in timely deliveries according to specifications.

The task that IOM has taken on for Marine Subsea, operating their RLWI-vessels, is a most interesting peak into what the future might hold. While it is IOM, IOSS’ parent company, that is a party to the contract, it seems likely that IOSS will get extensively involved, given their current operations in the field. It can be seen as a way to commercialise on the challenges encountered and the particular competence gained from operating in an alliance, and a source of revenues in the form of management fees without having to put up the equity. This limits the downside in this engagement, and given their unique experience in running an operative onshore organisation for RLWI, IOSS should be able to realise considerable savings through synergies. The predictability of such income would be a favourable complement to IOSS’ own income, at times being impeded by technical breakdowns and delayed deliveries. Furthermore, operating more vessels would allow IOSS to deploy newly developed equipment from more units, realising economies of scale with design and manufacturing, as well as harvesting more experiences from operations. Forming a larger pool of crew would also be beneficent in the long run, in terms of increased flexibility of Manning, and more
offshore personnel being eligible for key functions onshore, remedying some of the challenges encountered with Island Wellserver.

The capabilities that Marine Subsea has placed their trust in, may also be of interest to other entrants within various aspects of well interventions. Given the complexity involved in mounting a fully functional RLWI-vessel, various forms of partnerships can be a relevant path forward for many of those interested. IOSS’ experience within alliance management may be a useful competence in its own right, which other entrants would be willing to pay for. Pursuing such tasks would be interesting for IOSS for the same reasons that were presented in connection with Marine Subsea.
6 Conclusion
Based on the preceding analysis, the following two research questions can now be answered:

1. How have the key requirements for the success of Island Wellserver’s delivery been managed?

Concluding on the presented key requirements for success, it seems clear that the lack of resources invested in the early planning haunted IOSS and the alliance throughout the project, and inhibited both the learning and the application of own experiences. The eventual functionality and relevance of Island Wellserver has been maintained through allowing for variation orders during the building, despite the delays and cost overruns it has caused. The approach to the alliance partners’ work seems to have been somewhat reactive and “hands off” from IOSS, not responding sufficiently to the complexity and challenges that especially FMC was encountering, or the full impact of the different timing of spec freeze. IOSS also faced obstacles in exercising leverage on their partners, given the particular structure of the alliance. Cooperating with the client has been constructive and rewarding, with Statoil being receptive to suggestions from IOSS and amendments to contract. The pinnacle of Statoil’s involvement is undoubtedly their constant presence at FMC’s facilities during the final stages, effectively taking over IOSS’ supervisory task.

2. How has the delivery of Island Wellserver impacted IOSS’ capabilities?

The impact of Island Wellserver’s delivery on IOSS’ capabilities, are centred around the development of in-house competencies from the experiences made. The work has undoubtedly subjected those involved to a great deal of project training, but the setbacks, the tendency towards “ad-hocness” and the hectic pace may have reduced the benefits of this experience. The delivery and its obstacles have also further clarified the characteristics of the alliance structure, and is certainly a point that IOSS will keep in mind when considering future partnerships. With regards to Statoil, their active involvement may cause a lock-in effect that can be negative for IOSS’ competitiveness in the long run. In the greater picture, the delay may ease the entry of competitors in the industry, through reducing the lead that a new entrant has to close. The practical effect of this remains to be seen when Aker and DOF joins the industry, and one can assess the length of the initiation period that is required for them to operate consistently.
Bibliography

Empirical:


Aker Oilfield Services, May 8th, 2008: “Aker ASA Q1 Presentation”

Buset, Per, interview, February 4th, 2009

Dagens Næringsliv, 2008: “Oljeprisfall truer oljesand”
[http://www.dn.no/energi/article1508306.ece]


DOF Subsea Group, 2007: "DOF Subsea ASA has entered into long term charter contracts with Aker Oilfield Services Public Ltd."

Friedberg, Robert, 2006: “Second Generation Well Intervention Units”

Friedberg, Robert, 2007: “Talisman October 2007”

Friedberg, Robert, interview, February 3rd, 2009


Hansen, Frode, interview, February 3rd, 2009

Helix Energy Solutions, 2008: “Well Ops Vessels”

Island Offshore Management, 2006a: “IOM has been awarded 6 years contract with Statoil”

Island Offshore Management, 2008a: “Island Wellserver”

Island Offshore Management, 2008b: “Island Offshore has ordered a new large Well Intervention Unit from Aker Yards 15.07.08”

Island Offshore Management: "Riserless Well Intervention” [http://www.islandoffshore.com]
Island Offshore Management: “Island Frontier. Light well intervention vessel / subsea construction vessel”

Kleppe, Geir Ståle, e-mail, April 28th, 2009


[http://www.regjeringen.no/Rpub/NOU/20032003/005/PDFS/NOU2003200300050005000DDDPDFS.pdf]


Marinelog, March 2nd, 2007: “Aker Oilfield orders well intervention vessels”

[http://www.maersksupplyservice.com/News/pressreleases/2008/Pages/DeliveryofM%C3%86RSKTOPPER.aspx]

Nygård, Kristell, interview, February 5th, 2009

Offshore.no, 2008: "Island Wellserver kåret til årets fartøy”

Offshore.no, 2009: “Sparer milliarder på lett brønnintervensjon”

Oslo Børs, 2009a: "Oslo Børs – Shares”
[http://www.oslobors.no/markedsaktivitet/stockList?languageID=1&newt__menuCtx=1.1&menu2show=1.1.2.]

[http://www.oslobors.no/markedsaktivitet/stockOverview?newt__ticker=AKSO]
The Delivery of Island Wellserver


Ulstein Group, 2006: “Ulstein: Ship Design”

Vikebladet, February 6\textsuperscript{th}, 2007: “Hala i land største kontrakten i Ulsteinkonsernets historie”

\textbf{Theoretical}


Samfundslitteratur (2003): “Problemformuleringsguiden”


**Dictionary**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acknowledgement of Operation</strong></td>
<td>See “Samsvarsuttalelse”</td>
</tr>
<tr>
<td><strong>Anchorhandling</strong></td>
<td>The deploying or retrieving of anchors holding a drilling rig in position. Performed by very large and specialised tugs.</td>
</tr>
<tr>
<td><strong>Brent Crude</strong></td>
<td>Light crude oil from the “Brent” field in the North Sea. Used as a reference for quality and price of North Sea oil.</td>
</tr>
<tr>
<td><strong>Deadweight</strong></td>
<td>The combined weight of everything carried by a ship. Cargo, equipment, fuels, provisions, crew, etc.</td>
</tr>
<tr>
<td><strong>Derrick</strong></td>
<td>The tower used for deploying and retrieving drill pipe.</td>
</tr>
<tr>
<td><strong>Drilling rig</strong></td>
<td>A steel platform used for drilling. Semi-submersible rigs are common in the North Sea, ballasting down and anchoring before drilling. May or may not have propulsion and DP.</td>
</tr>
<tr>
<td><strong>Dynamic Positioning (DP)</strong></td>
<td>Satellite-based control of the propulsion system, keeping a unit on station by GPS-signal.</td>
</tr>
<tr>
<td><strong>Heave-compensation</strong></td>
<td>Winches in cranes or lifting devices that compensate for the heaving movement of a floating unit. Increases accuracy of subsea work.</td>
</tr>
<tr>
<td><strong>Hydrocarbons</strong></td>
<td>Crude oil, natural gas, or a combination thereof. Mostly used about resources in reservoirs.</td>
</tr>
<tr>
<td><strong>Increased Oil Recovery (IOR)</strong></td>
<td>The various methods applied to retrieve more of the known crude oil reserves, or speed up the extraction rate.</td>
</tr>
<tr>
<td><strong>Installation</strong></td>
<td>An installation made from steel or concrete, fixed to the seabed to service a specific oilfield.</td>
</tr>
</tbody>
</table>
Light Well Intervention (LWI) Various work performed to service or enhance producing wells.

Lubricator A cylinder through which L WI tools enter the well. Pressurised with grease in order to contain the oil from beneath.

Module Handling Tower A tower located above the moonpool, that lifts or lowers the heavy components being used subsea.

Moonpool An open basin located amidships, providing direct but protected passage from the deck to the sea.

Norwegian Continental Shelf (NCS) The eastern section of the North Sea, under Norwegian jurisdiction.

Riser The pipe in which oil flows up from a well.

Riserless Well Intervention (RLWI) Intervention work being performed without going through a riser.

Remote Operated Vehicle (ROV) A self-propelled, unmanned subsea vessel, typically used instead of divers for installation work and inspection. In layman terms: a “mini-submarine”.

Samsvarsuttalelse (SUT) An approbation from the Norwegian Petroleum Safety Authority, allowing the unit in question to work in live wells on the NCS.

Skidding rail A network of rails laid out on the main deck, for movement of heavy objects.

Stack The combined subsea equipment that is necessary for carrying out intervention work. The lubricator and the WCP are elements of the stack.

UK Continental Shelf (UKCS) The western section of the North Sea, under United Kingdom jurisdiction.
<table>
<thead>
<tr>
<th><strong>Well</strong></th>
<th>A single access point to a reservoir of oil or gas. One installation may control a number of wells.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Well Control Package (WCP)</strong></td>
<td>The control equipment placed on top of a well before intervention work. FMC Technologies is a major global provider.</td>
</tr>
<tr>
<td><strong>Wireline</strong></td>
<td>Wire, both electrical and plain, that is used for lowering equipment into a well for certain functions, or installing logging instruments.</td>
</tr>
</tbody>
</table>