Simultaneous Activities in the Offshore Petroleum Industry

- *Concept and safety related implications in the light of regulation*

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EXECUTIVE SUMMARY

This thesis is submitted in fulfillment of the requirements for a Master's degree in Societal Safety at the University Of Stavanger, Norway. The thesis is a part of the project "*Robust regulation in the Petroleum Sector*" funded by The Research Council of Norway, and directed from the University of Stavanger.

Accidents often have its root causes in organizational factors. Regulation is an important organizational factor and constitutes the motivational grounds for the choice of topic. The recent Deep Water Horizon accident in the US and several near accidents in Norway over the last few years have highlighted the importance of regulation, and demonstrated the relevance of this topic for a Master`s thesis. A basic assumption in this study is that simultaneous activities must be seen as a phenomenon with strong organizational implications. Hence, the study discusses how safety in these operational settings is handled through regulatory efforts in the Norwegian petroleum industry.

Norway's goal-oriented, self regulatory style (re the internal control principle) is expected to produce benefits like increased innovation and development, a strengthened focus on operating responsibilities, and active ownership to rules and regulations. A drawback may be however that this internal control principle and the use of goal-oriented regulations along with legal standards, opens up for a considerable variation of unintended company interpretations. The understanding of hazards connected to certain activities may suffer accordingly.

The petroleum industry is complex and the inclusion of several stakeholders in simultaneous activities adds to this complexity. In my literature study on the same topics, written for the course *"Risk Regulation and Audit"* at the University of Stavanger in 2010 and leading up to this thesis, key results indicated that the goal-oriented legislation and other regulatory efforts (regulatory control components) surrounding simultaneous activities might lead to safety related problems in today's petroleum industry, re considerable changes in both technical and operational conditions since these regulations came into force (*"The Regulatory Regime for Simultaneous Operations in the Petroleum Industry"*, Thaule-Pedersen, UiS 2010). The

findings in this study also indicated that the term “simultaneous activities” exists in several variations and is used inconsistently.

The purpose of this Master`s thesis was to test these initial desk study results against corresponding empirical findings. The empirical findings are based on interviews with stakeholders at four levels in the industry; operator, rig-company, sub-contractor, and the Regulatory Forum (represented by informants from each side in the three-partite collaboration), who were asked about the phenomenon of simultaneous activities (concept, hazards, and regulatory control components).

The initial literature study findings are confirmed in this thesis, with these concluding comments:

- The understanding and risk evaluation of the phenomenon of simultaneous activities shows inconsistency and/or varies between core stakeholders in the offshore petroleum industry.
  A correct interpretation of regulatory control components is important to achieve a common understanding and risk evaluation between the stakeholders of the industry. However, the regulation of simultaneous activities is in general not known by the informants and the interpretations seem to suffer from an unsatisfactory understanding accordingly.
- The regulatory control components addressing simultaneous activities have not been updated to comply with the new complexity of the offshore petroleum industry and might lead to increased risk.

Consequently, the unique arena for collaboration that exists between stakeholders and government in Norway might be even more valuable if today’s typically functional regulations were more concrete, and such measures could even be done in collaboration with the industry. More concrete regulations could also have given both the PSA and the industry more legal support. Recommendations towards the regulatory control components could e.g. include:

- Ensure consistency in terms when addressing the phenomenon of simultaneous activities. The terms to be used should be defined and set in cooperation with the industry.

- Move towards more specified regulations regarding simultaneous activities, e.g. by addressing certain selected and critical interfaces between simultaneous activities and operations, and increase focus on all main activities (not only drilling and well).
- Set a standard format for handling Work Permits.
- Increase audit activity and methods for efficient experience transfer for simultaneous activities.
- Increase the focus on the complex safety aspects related to technological, operational and organizational hazards in simultaneous activities.

Methodologically, these findings are based on a relatively small empirical material and more extensive verification (i.e. by inclusion of more informants) is recommended, in addition to the fact that these findings have generated several other questions that ought to be addressed in further studies:

- In what ways can an increased operational and organizational complexity be a risk factor, and can this complexity be reduced in the future offshore petroleum industry?
- Could computer based systems have been implemented at the installations to better visualize the activity level on each offshore installation, and thus provide better oversight and a tool for communication and shared knowledge amongst stakeholders?
- Why and how do the regulations differ in their levels of specification, and may inconsistent regulations have significant risk implications?
- How can the offshore petroleum industry and its organizations come closer to the normative theory of High Reliability Organizations?

TABLE OF CONTENTS

FIGURES

TABLES

APPENDIX

1. INTRODUCTION

This study is a Master`s thesis within Societal Safety at the University of Stavanger, and is a part of the project "*Robust Regulation in the Petroleum Sector*[1]" which s funded by the Research Council of Norway and directed from the University of Stavanger.

The petroleum industry constitutes a large part of Norway`s industrial market. This along with The Deepwater Horizon accident in the US in 2010, and the many "near to be accidents" in Norway the same year, has made regulation of the Petroleum Industry an issue of much debate, and therefore also an interesting case for a master's thesis within the field of Societal Safety.

In a world where markets are expanding and demands for effective production processes are rising, the regulation of simultaneous activities is increasingly a subject of matter for assuring safety in the petroleum industry. The industry is now in a phase of restructuring. Installation age and equipment wear are increasing and call for excessive maintenance in the years to come. At the same time the industry is struggling to find new ways of exploiting the remaining resources in Norwegian oilfields. Hence, modifications on the existing offshore installations are needed. Norwegian oil companies are also more closely interacting with the rest of the world than ever before, and this connection means both increased competition and a need for cooperation amongst different companies through outsourcing of services not regarded a part of the companies` core business. The numbers of companies operating on Norwegian licenses are simultaneously increasing, and personnel from different cultures and nationalities are bound to work together at the same installations. In*" Safety- Status and Signals*" (2010), Magne Ognedal, Director of The Petroleum Safety Authority (PSA), reflects on the issues currently most important for the PSA and the petroleum industry as a whole:

"The petroleum industry in Norway has changed its character over the last years. The main image today is an industry set together with many small and new companies, in addition to one big and dominating one. At the same time the offshore activity is characterized by aging installations, major restructuring processes and very compound groups of license holders.

[1] Further information on this project is found at http://seros.uis.no/category.php?categoryID=6832

The PSA has started a comprehensive work of strategy to analyze what measures to assess as a regulatory body in light of this situation." (Safety- Status and Signals, 2009-2010: 7)

The extensive changes might have caused decreased focus upon safety related issues (Stortingsmelding[2] 7, 2001-2002). The PSA finds that there is often evidence of failure in communication between the contractors and their subcontractors. These observations are connected to unclear relations of responsibility, deficient management of simultaneous activities and lack of coordination between the different management systems. A question from the RNNP (Risk Level Norwegian Petroleum Industry) report from 2003 clearly illustrates this: 73% of contractor employees agree that differing installation procedures are a safety threat (Stortingsmelding 12, 2005-2006:34). Conflicts of interest and use of power can easily become a part of this new situation on the shelf. In the government Research & Development Strategy for HSE in the petroleum industry (FoU, 2007), the following comment was made:

"There is a need for more knowledge about how power relations affect the health, safety and environment in the petroleum industry" (FoU, 2007).

The Deepwater Horizon accident serves as a recent example on how several companies and their interdependencies may increase the level of risk, and how good communication between the included companies is crucial for making the right safety related decisions.

Due to the above mentioned factors, complexity at all levels is inevitable. The safety in simultaneous activities will thus depend on the responsible stakeholders' ability and willingness to handle this complexity, and the regulations given by the government might be seen as crucial for how this work is performed.

1.1 Purpose

Organizational factors such as coordination of work processes, cultures and management systems are nowadays considered very important in all safety related work. However, the dynamic change of safety related frame factors over time, as mentioned in the introduction, creates a number of analytical challenges. Consequently, governmental agencies will notoriously struggle to address these factors with updated regulatory control components.

[2] White Paper

Still, prevention of accidents has, at least in theory, become synonymous with a strong emphasis on these barriers. The PSA has stated that they want to increase their attention towards this area. This was further described in a report ordered by PSA from Institute for Energy Technique, where the industry`s own investigational reports were analyzed. The findings are well illustrated by the following concluding comment:

"There seems to be general consensus with respect to the importance of organizational factors, but there is lack of consensus and a shared platform when it comes to determining what organizational dimensions that are relevant to address" (Thunem et.al. 2009:37).

Organizational factors are tricky. They often involve very complicated systems of management, cultures, and conflicting interests. Audits and investigations of these factors demand considerable professional and economic resources. Considering the difference between technical, human and organizational factors, the latter is not so measurable. Seemingly, what can be measured is handled, and little is done with the issues not so measurable. Reason (1997) points out that 80% of major accidents have organizational root causes. Regulation is also an important organizational factor, as it affects decisions taken further down the socio-technical[3] system (Rasmussen, 1997). Little examination on the role of regulation in risk evaluation is done (Fisher, 2007). The regulation of the offshore petroleum industry in Norway has gained much positive attention the last few years, especially after the Deep Water Horizon accident in the USA last year. It is said that the US government wants to learn from Norway's way of doing things. Norway has, different from many other countries, chosen a goal-oriented and risk-based type of regulations. How then does such goal-oriented regulations, along with other regulatory efforts, handle the tendency towards a more complex and demanding operational situation in today`s petroleum industry?

The choice of the present case - simultaneous activities – was especially based on informative conversations with HSE and technical-operational personnel in the petroleum industry, which initially resulted in a paper written for the course *"Risk Regulation and Audit"* at the University of Stavanger, fall 2010. The title of the paper was *"The Regulatory Regime for Simultaneous Operations in the Petroleum Industry"*. A central conclusion in this paper was

[3] Rasmussen(1997) presents a model of the socio- technical system, which consists of vertical levels of contributors to safety related decisions, ranging from governments to actors. The bottom levels are affected by the top levels, but the influence also moves the other way. Decisions are also affected by technological, market changes, and political and public awareness.

that the regulation surrounding simultaneous activities might lead to safety related problems in today's petroleum industry whereas both technical and operational conditions have considerably changed since these regulations came into force. The paper also pointed out that the term simultaneous activities exists in several variations and is used inconsistently.

1.2 Problem and hypotheses

Key results from the article *"The Regulatory Regime for Simultaneous Operations in the Petroleum Industry"* (Thaule-Pedersen, UiS 2010[4]) constitutes the background for this study. The article was a literature study, and the purpose of this thesis is to see whether the results still seem reliable after testing the initial desk study results against corresponding offshore empirical findings. The problem is as follows:

"How is safety in simultaneous activities handled through the chosen regulatory control components in the Norwegian petroleum industry?"

The overall purpose of this study is to examine:

1. How is the phenomenon of simultaneous activities expressed by the interviewed core stakeholders in the petroleum industry (government, labour unions, employer associations, operators, rig companies and sub-contractors)
2. How are these activities regulated through laws, regulations and audit activity?
3. How do governmental regulatory efforts (i.e. standard setting, information gathering, and behaviour modification) handle the phenomenon of simultaneous activities regarding conflicting interests, power, and complexity?

Based on the issues outlined earlier, the problem and the research questions, three hypotheses were formulated:

H 1- The core stakeholders of the petroleum industry will have different understandings of the phenomenon of simultaneous activities depending on their positions and roles.

[4] This article is not published material, but may be obtained by contacting the author of this thesis.

H 2- The chosen regulatory control components are important for a common understanding about the phenomenon of simultaneous activities and the hazards[5] connected to it.

H3- The given goal-oriented regulation of simultaneous activities is not coherent with the complexity of today`s petroleum industry and might lead to increased risk of accidents.

The three hypotheses are thought interconnected like figure 1 shows. The understanding of the phenomenon of simultaneous activities will be affected by both the hazard, the regulatory control components, and of conflicting interests and power. Differing views on the phenomenon, the complexity of the context, combined with the chosen regulatory control components (Regulatory Style) might result in an increased risk of accidents.

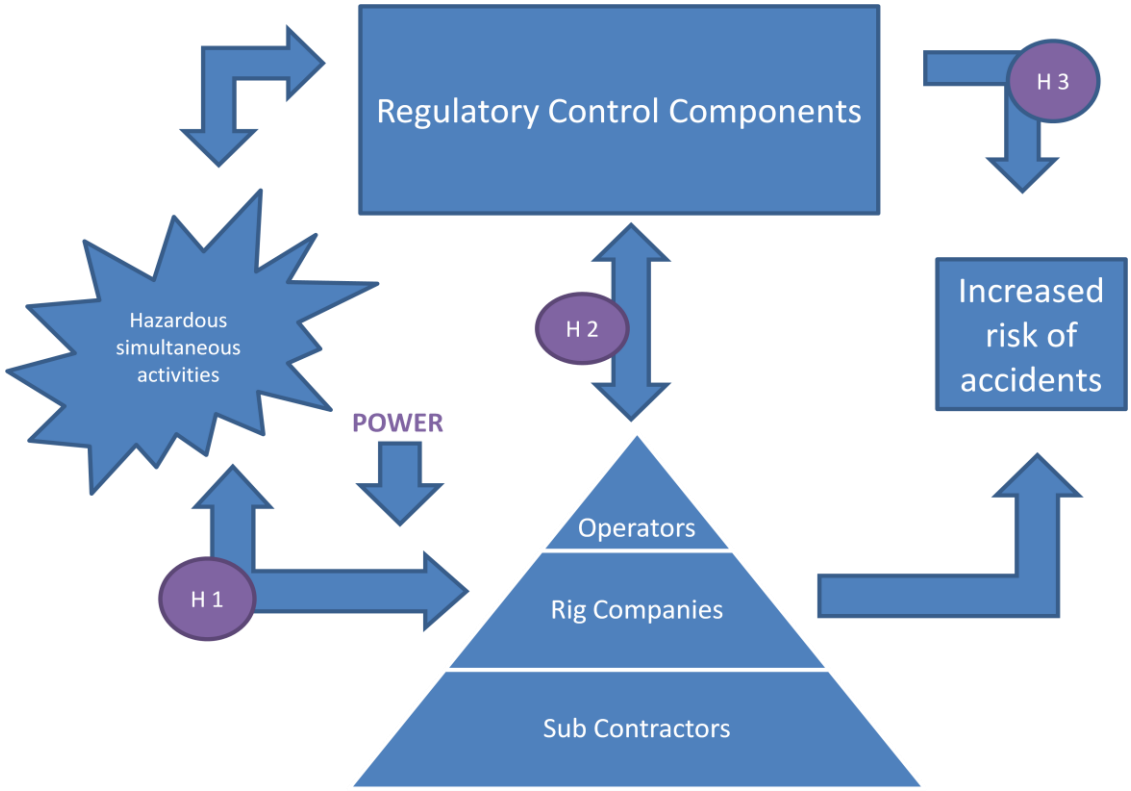

Figure 1- Hazardous simultaneous activities and the relations that might affect risk level.

[5] Hazard is defined as actions or conditions that might lead to an undesirable event. Risk is defined as the hazard that these unwanted events represents for humans, environment or material values. Risk is expressed by the probability and the consequences of the unwanted events. Safety is defined as freedom from the conditions that might cause death, damage work related illness, or damage to or loss of equipment, and damage to the environment (Rausand, 2009).

1.3 Limitations

To limit this thesis it is first necessary to investigate the concept of simultaneous activities. The term itself exists in several variants. In the legislation it is called simultaneous activities (Norwegian: Samtidige aktiviteter). The PSA also uses the term parallel working operations (Norwegian: Parallelle arbeidsoperasjoner), and the Norwegian petroleum industry often refers to it as SIMOP (Simultaneous Operations), using the English term for it. In this thesis, however, the term "simultaneous activities" will be used as defined in the Norwegian regulations.

Still, the term "simultaneous activities" covers a broad range of activities. It may be used to describe several operational settings. It may refer to operations progressing at one defined area on one single installation offshore, and may also be used to describe situations where more than one vessel operates in the same area in cooperation with one or more installations or vessels. The term is also used to describe different operations occurring at the same time in onshore petroleum facilities. The term simultaneous activities have also another important side to it. Several companies cooperating on one single operation might also be seen as simultaneous activities (See chapter 2.5 The Deep Water Horizon accident), where a number of companies serve different tasks during different stages of one operation, and at different levels in the organization. Subsequently, the companies are simultaneously working with their scope of work, and the level of safety in these kinds of operations depends heavily on the ability to establish a management system with a common understanding of applicable regulations, and the ability to operate within this setting.

In this thesis, "simultaneous activities" will be referred to as an (operational) phenomenon rather than a (theoretical) term. This allows a broader analytical reflection, i.e. limiting the phenomenon of simultaneous activities to its pure conceptual sense is not considered fruitful for this study. What can be limited however is the context in which simultaneous activities takes place, and a natural place to start is to limit simultaneous activities to "offshore installation activities". This will mark the edges of the thesis both in determining which laws and regulations to include[6], and what kind of organizations to address. Offshore installations are different in their scope of work. Some are both production and drilling installations and some have drilling as their only task. The expected benefit of including all types of offshore

[6] It is worth to notice that movable drilling units needs to be in compliance also with Norwegian Maritime Directorate`s laws and regulations. These regulations will not be a part of this study.

installations is to see how the applicable legislation is understood within the different companies included in the study. Summarized this study will address:

- All Offshore Installations
- Petroleum Industry Regulatory Control Components addressing simultaneous activities on offshore installations.
- All levels of stakeholders in the petroleum industry, operators[7], rig companies[8] and sub- contractors[9].

The term "regulation" in this thesis refers to the concept of controlling risks regarding health, environment and safety in the Petroleum Industry. Regulation might be defined as "*sustained and focused control exercised by a public agency over activities that are valued by a community*" (Selznick, 1985 quoted in Baldwin & Cave, 1999:2). This thesis will focus upon the regulatory control components; standard setting, information gathering and behaviour modification, defined by Hood et.al. (2001).

1.4 Structure of the thesis

After the introduction, chapter 2- Context will be outlined. This presents surroundings that will enable the reader to see the relevance of the issues included in the hypotheses. The chapter starts with a brief description of concepts that will be discussed in this study. This is followed by regulatory development within the Norwegian petroleum industry to set the current regulation and state of the industry in a historical perspective. A description of complexity and what it means for the industry is then outlined, and illustrated through a figure. Components of regulatory control addressing simultaneous activities will follow, and the end of chapter 2 will contain a description of the Deep Water Horizon accident. This is to show the variety of the phenomenon and to argument for the relevance of addressing simultaneous activities in a safety related context.

Chapter 3 provides a theoretical framework for addressing the issues outlined in chapter 1 and 2. Regulation is defined and elaborated by dividing it into reasons for regulating, regulatory

[7] The term "Operator" refers to companies that owns the license for exploration of petroleum
[8] "Rig Company" refers to companies that own and drift drilling facilities offshore
[9] "Sub Contractor" refers to companies that offer services to both Operator and Rig-Companies

strategies, and a presentation of principles for good regulation in a safety- related setting. Some theory on risk perception and the understanding on concepts and their different forms are then added to underline the importance of this for the management of safety. Risk perception and understanding of concepts are through the hypotheses thought related to power and diverging interests of the different actors, and the next theoretical contribution discusses these issues. The theoretical chapter is not meant as a full description of the topics presented, they are only there as an extension of chapter 2, to provide a further context for the discussion of empirical data.

Chapter 4 issues the methodology used to conduct this study. The chapter also provides an insight into the theory that was chosen. A model which will connect context, theory and empirical categories with the hypotheses is also presented here. Chapter 5 will present the findings collected via interviews with actors in the petroleum industry, and chapter 6 will discuss these findings with the use of the context, the theoretical framework and other contributions related to the chosen theories. Conclusions and implications of the findings along with suggestions for further studies are presented in chapter 6 and 7, and mark the end of the thesis.

2. CONTEXT

2.1 Conceptual clarifications

2.1.1 Legal terms

When addressing regulation it is necessary to first present some useful legal terms.

The Norwegian legal system has traditionally (Since 11-1300 AD) been influenced by Roman statutory law where the legislations written content was seen as the most important part of the regulatory system. Disputes were solved in courts, and a general principle was that any decision by a court or any public authority should have basis in written law. Another legal tradition is called common law, and was originally influenced by the Germans. This tradition had a more vocal approach to laws, and disputes were often solved based on discretion.[10] Even if influenced by statutory law in general, some traces of the German common law tradition are found in the Norwegian Regulatory System, is for instance in the health, environment and safety regulations for the petroleum industry (Braut & Lindøe, 2010:1). This is mainly related to the use of legal standards (Braut & Hellebust, 2010). A legal standard is a designation taken from the Anglo-American law, and in modern language used to referring laws or phrases in law that has no quite accurate content, but that only indicates discretionary basis or standard for juridical determination of individual cases. The specific laws` content is therefore determined by the courts (Store Norske Leksikon, 2011). When the legislation provides a legal standard, it means that the content is developed and changed over time as part of social development. Legal standards in this way have a dynamic character. Wording refers to a benchmark or the norms of behaviour that are beyond the law itself, and in practice there will be a development of the standard content (often through legal and governmental practice) (Stortingsmelding 7, 2009-2010).

Simultaneous activities

Defining simultaneous activities is not an easy task. Limiting it to a set of well described activities would maybe not be advantageous either, because one of the purposes of this thesis is to show how terms as this might be understood differently amongst different actors in the petroleum industry.

[10] Information given through the course "Risk Regulation and Audit", University of Stavanger, by Braut, G.S.(2010)

The impression is that simultaneous activities are not well described in any literature regarding safety in operations offshore. A guide on Quantitative Risk Assessment (QRA) for offshore installations is however available, and the following information is extracted from this guide. Simultaneous activities are here described as:

"Simultaneous operations in offshore activities involve the concurrent execution of two or more independent hazardous operations such as drilling, wire lining, construction and maintenance."(Spouge, 1999: 190)

This definition shows that both production installations and pure drilling installations might have simultaneous activities occurring.

On multi-well platforms, production may be started as soon as the first well has been drilled, completed and tied-in. If production then occurs while subsequent wells are being drilled, it is usually known as simultaneous drilling and production (SD&P). Other terminology amongst different companies includes simultaneous production and drilling (SIRPROD), and concurrent production and construction (SDP&C) (Spouge, 1999)

Drilling, production and construction each involve significant hazards. Regarding safety it would therefore be desirable for them to be conducted separately. But there are advantages of conducting these task simultaneously, including:

- Generates revenue earlier in the project. This is important for installations with long drilling programs or marginal economics.

- Reduces production down-time. This is important for fields with guaranteed production contracts.

- May provide early reservoir performance data for future planning and enhanced recovery studies (Spouge, 1999).

Interaction of production and drilling operations may increase the likelihood of accidents in both, because the accident frequency may increase compared to normal operations. A drilling accident may have knock- on effects on the production activities and vice versa. The potential for escalation is therefore greater than in normal operations. The presence of both drilling and production personnel in the same area, makes each group of personnel targets for accidents in the other group of personnel`s area. Interference between drilling and production wells is a possible cause of blowouts. Drilling and production departments have separate command

structures. Complex lines of command may increase the risk during SD&P operations. On the other hand, some aspects of SD&P operations might reduce the risks. The platform is through simultaneous operations exposed to other risks (collisions, structural failures) for less time. Other personnel who are required offshore (e.g. maintenance personnel) are exposed to risks in less period of time. The presence of a drilling rig may also provide an additional escape route from a wellhead platform (Spouge, 1999).

These challenges of simultaneous operations may be viewed as technological. However, the organizational challenges are also worth considerations. Safety management has a particular importance during these kinds of operations. Assuring safety during simultaneous operations are dependent on good communication and well defined lines of authority between the different crews operating at the same installation. Assurance of a minimization of unnecessary personnel in the wellhead area, and coordination of emergency procedures are also of importance (Spouge, 1999).

2.2 Regulatory development

At the beginning of the 1960`s there were little competence in Norway on exploration, production and refinement of petroleum. There were no educational options, no public organs or public institutions with petroleum industry as workspace, and there existed no laws or other regulations especially addressing this area (Tønnesen, 2008).

The first oil companies to establish in Norway were mainly foreign ones, and they represented a whole new sphere of power and influence. The Norwegian government lacked the experience with this kind of business. This resulted in the oil companies functioning more or less on their own, as where they were occupied with keeping their autonomy towards the Norwegian regulatory organs (Lindøe & Olsen, 2007). When the Parliament was to treat the issue of petroleum for the first time, the risks of blow-outs were in focus. Consequences for the Fishing Industry were naturally especially addressed because of the long traditions and comparatively high level of income from this sort of business in Norway (Ryggvik, 1997).

Norway has long and strong traditions for the so called “three partite collaboration”, meaning a tradition for collaboration between government, employer and employees. Considering this and the lack of competence on Petroleum Industry, the oil companies played an active part in

the regulatory development. The Industrial Minister at the time, Sverre Walter Rostoft, said that Norway already at this time had the most rigid and detailed regulations for petroleum exploration. Even if the oil companies had much to say in the development of these regulations, the former trust in these had somewhat faded after a spread of knowledge about major accidents in petroleum industry around the world (Ryggvik, 1997).

The first 10-15 years, the Norwegian shelf was haunted by accidents. The unknown technology, combined with the lack of effective regulatory mechanisms made this fact evident. The Petroleum Directorate was established in 1972. At the same time the environmental issues were set on agenda at a major UN- conference in Stockholm. A report presented here recommended decentralized mechanisms of management within the frame of what was called "Reflexive Regulation". This made the starting point of a new regime within safety related regulation based on principles on self-regulation (Lindøe & Olsen, 2007).

In time, the Norwegian culture for regulation and collaboration won through with the foreign companies, and an extensive cooperation exists today through projects like "Risk Level Norwegian Petroleum Industry" (RNNP). This is a report published every year from the PSA, and consists of data collected in cooperation with the industry (Lindøe & Olsen, 2007).

With the new safety policy raising in the 1980`s, and with this a series of regulations, limitations on simultaneous activities were also included. This led to a significantly better level of safety also on the large and complex installations (Dahl- Jørgensen et. al, 2002).

Major studies were conducted in Norway on petroleum activities during the 70 and 80 ties, and simultaneous activities were also included. The development of Statfjord B, one of the first, major oilfields on the Norwegian Continental Shelf (NCS), was stopped for one year by the Norwegian Petroleum Directorate (NPD) partly because of risk related considerations towards simultaneous activities (Andresen[11], NPD). Norway was the first country in the world to introduce legislation regarding simultaneous activities. The Royal Decree of 9 July 1976 related to Safe Practices for the Production of Submarine Resources, § 97, required that: *"Drilling and production shall not take place simultaneously from the same production facility unless special consent has been obtained in each case"*. Now, most Norwegian platforms have consent for these kinds of simultaneous activities, and are generally regarded as a formality (Spouge, 1999).

[11] Information given through conversation in February 2011.

January 2001 five new regulations came into force within the area of health, safety and environment in the petroleum industry. These consist of the overall regulation known as the Framework Regulation, and four subordinate regulations, termed the Management Regulations, Technical and Operational[12] regulations, Facility regulations and Activity regulations. These safety regulations replaced the previous 23 regulations, but continued mainly the existing law. Regulations are issued pursuant to a series of laws, including the Petroleum Act, the Working Environment Act and the Pollution Control Act. They are managed by the PSA, the Norwegian Pollution Control Authority and the Norwegian Board of Health jointly with PSA in a coordinating role. The reduction in the number of regulations was possible since the regulations were made more fragmented; they were designed as functional requirements and an extensive use of references to standards were also implemented (Logstein, 2007).

2.3 Complexity in the offshore petroleum industry

Complexity as a threat to safety is much debated within the theoretic al field of safety. Charles Perrow, a proponent of this view, states that complexity is the most disturbing safety threat in modern society (Perrow, 1999). Perrow states that serious accidents will continue to happen as long as technologies and their surrounding organizations is complex in nature (Perrow, 1999).

Offshore installations might be seen as a playground for huge organizations consisting of members of several different organizations, sometimes at the three levels outlined earlier; operator, rig-owner and contractors. In complex systems several activities take place in parallel. Actors may thus have incomplete or inaccurate knowledge of the system as a whole (Rosness, 2004). This might pose a threat to safety.

Figure 2 (next page) illustrates the offshore petroleum industry as a complex system. Four main activities may occur at the same time on one single installation; drilling, production, maintenance and modifications. Within all of these, several minor activities might occur. In addition, one might also add helicopter landings and takeoffs. Vessel activities nearby the installations could also be viewed as additional activities. All of these activities are handled

[12] Only onshore petroleum industry is addressed in these regulations.

by several stakeholders, and these stakeholders might have their own languages, cultures, management systems, and also different interests implemented in their presence.

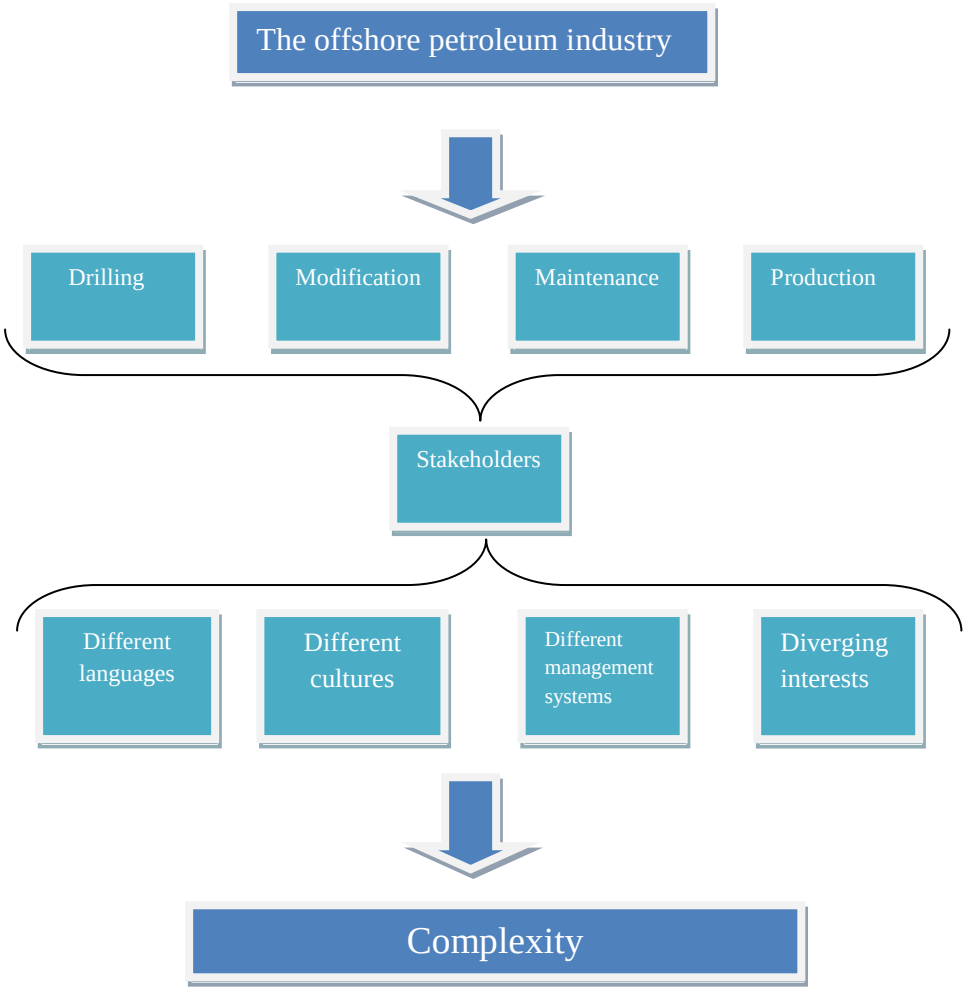

Figure 2- Complexity in the offshore petroleum industry

One of the purposes of this study is also to explore whether *different interpretations* of the regulations and hazards of certain activities (in this case simultaneous activities) could be added to this picture.

2.4 Components of regulatory control

This study will build upon the idea of regulatory regimes. Within this perspective it is argued that any control system, such as a regulatory regime must include at least three components: capacity for information gathering, standard setting and behavioural modification (Hood et al, 2001). This chapter will outline how these components are filled in the chosen context, regulation of simultaneous activities in the Norwegian offshore petroleum industry (It should be mentioned that the categories within a regulatory regime might not totally exclusive. Components of one category might also fit into another category).

2.4.1 Standard setting

All offshore activity in Norway is regulated through the Petroleum Activities Act and underlying regulations[13]. The PSA is the regulator for technical and operational safety, including emergency preparedness, and for the working environment in all phases of the petroleum activity - such as planning, design, construction, use and possible later removal. Authority has been delegated to the PSA by the Ministry to issue more detailed regulations for safety and the working environment in the industry, and to take specific decisions in the form of permits and consents, orders, enforcement fines, halting operations, prohibitions, dispensations and so forth (PSA 1, 2011)

Most requirements concerning offshore petroleum industry are to be considered functional, also termed goal-oriented, the government sets the goals, and every company has to create their own management systems to meet these goals.

The regulations require that risk analyses are carried out to identify possible incidents during operations, and the consequences these may have of human, environmental and economic character (Rf. The Management regulations, section 17, 18, 19). The Framework Regulations § 9 points out that harm or danger to people, the environment or to financial assets shall be prevented or limited in accordance with the legislation related to health, the environment and safety, including internal requirements and acceptance criteria. Above this level of risk shall be further reduced to the extent possible.

[13] All of the regulations referred to in this chapter might be viewed in English at http://www.ptil.no/regulations/category216.html.

Simultaneous activities in offshore petroleum industry are especially mentioned in The Activity Regulation § 28 "Simultaneous Activities":

"The responsible party shall define which activities that, in combination with other activities, shall be considered simultaneous activities. When conducting simultaneous activities that contribute to an unacceptable increase in risk, the necessary measures shall be implemented, cf. Section 9 of the Management Regulations."

"The responsible party" is described in Section 7 of the Framework Regulation:

"The operator and others participating in the activities are responsible pursuant to these regulations. The responsible party shall ensure compliance with requirements stipulated in the health, safety and environment legislation. The operator shall ensure that everyone who carries out work on its behalf, either personally, through employees, contractors or subcontractors, complies with requirements stipulated in the health, safety and environment legislation. In addition to the duties imposed on licensees and owners of onshore facilities by individual provisions in these regulations, they are also responsible for ensuring that the operator complies with the requirements stipulated in the health, safety and environment legislation" (The Framework Regulation).

The Activity Regulation § 28 is followed, as all other regulations, by a guideline. It is placed there as a help to interpret the content of the actual regulation. In the guidance a more specific definition of simultaneous activities is given, through a reference to the NORSOK standard D-010 Well integrity in drilling and well operations chapter 4.5. The regulatory body recommends through the guideline that this standard is used to fulfil the requirements for drilling and well activities.

The standard outlines the following about simultaneous operations:

"Simultaneous and critical activities and operations shall be thoroughly planned, analyzed and performed with the objective of limiting additional risk imposed by multiple activities and operations at the same time, as opposed to the risk associated with the execution of these individually. Acceptance of simultaneous and critical activities and operations shall be in accordance with defined acceptance criteria and shall be quality assured through risk

assessments. Procedures for the control of simultaneous and critical activities and operations shall be developed and approved prior to commencement" (NORSOK D-010, ch. 4.5.1).

The following activities/operations are defined as simultaneous if two or more of these are executed at the same time within the defined area for such activity:

Coiled tubing
Completion
Conductor installation Applies when the installation is defined as "hot".
Major Construction or modification work on an installation.
Drilling with BOP installed
Drilling with diverter installed
Drilling with no diverter or BOP installed
Injection or flowing from tubular annuli
Injection or flowing through temporary lines
Pipe line pigging with potential for release of hydrocarbons.
Production or injection of hydrocarbons or water
Moving of rig skidding
Snubbing
Through tubing drilling and completion operations
Under balanced drilling and completion
Wireline

(NORSOK D-010, 4.5.2)

2.4.2 Information gathering

This point is central to all regulation. Regulators vary in how they collect information on risk factors. These methods can be active, reactive or interactive (Hood et.al, 2001).
The active method of data collection means that the regulator is scanning a risk area for information about a given regulation. A reactive approach will pave the way for others to give this information. The interactive method is a compromise between those two, and will say that the regulator, for example, asks for periodic reports from the control objects, and then respond to these.

In Norway it is up to the companies to report back to the authorities, as regulated by the Management Regulations § 3 concerning the management of health, environment and safety. This refers to the systematic measures that will ensure that the activities planned, organized, conducted and maintained in accordance with the requirements that are pursuant to the health, safety and environmental legislation. This regulation refers again to the Framework Regulations § 13 regarding the obligation to establish, follow up and further develop the management system (the Management Regulations, the Framework Regulations). These demands are equal to the Internal Control Regulations for Health, Security and Environment that applies to other than petroleum industry in Norway.

System audits, in which the Authority is to inspect that this system actually exists and is updated in the business, is some sort of active method. In 2010, the PSA carried out one audit of the management of risk, health, safety, working environment and emergency preparedness in connection with simultaneous activities and modifications on Troll A[14]. The background for this audit was that Statoil was in the process of installing new living quarter's modules on Troll A simultaneously with the facility being fully operational. The PSA found no non-conformities but had suggestions for improvement due to unclear roles and responsibilities in establishing temporary escape routes, and deficient systematic in risk management for health and working environment loads (PSA 2, 2011) So far in 2011, the PSA has performed one audit that has addressed simultaneous activities. It was on Skarv FPSO[15] operated by Shell. This time, simultaneous activities were however not the theme for the audit, but deviations related to the Activity regulations § 28 were found. The PSA noted that the FPSO had not

[14] Troll A is an installation owned and drifted by the Norwegian operator Statoil (Olje og energidepartementet/Oljedirektoratet, 2010) (OED, OD, 2010) (The Ministry of Petroleum and Energy/ Norwegian Petroleum Directorate).
[15] Floating Producion, Storage and Offloading. Floating platform, or ship.

clearly defined the tasks for operators in the control room during unloading operations, and that limitations of simultaneous activities were not clearly defined (PSA 3, 2011).

Reactive methods are used when there has been an accident. For the authorities to be aware that anything has happened, supervised object needs to report this. The PSA will then perform an investigation of the accident if the required severity for this is present, and the report after this investigation constitutes an important basis for the authorities regarding information about risks and the agencies' handling of it. The PSA might also let the company themselves perform an investigation.

An example of a method which might be characterized as both interactive and active is the PSA report RNNP[16]. The RNNP process was initiated in 1999-2000 to develop and apply a tool for measuring trends in risk level in the Norwegian petroleum activity. A variety of data related to major accidents, barriers, serious injuries and selected work environment factors are collected and analyzed. They conduct a comprehensive survey and a qualitative study to highlight some aspects related to external conditions and their impact on HSE. In the case of simultaneous activities PSA has incorporated a question regarding this risk area in their questionnaire that they use as grounds for this report every other year.
A search in the RNNP report from 2009 for issues relating[17]simultaneous activities gives three hits. These are all related to the questionnaire they have used as a basis for the report. The question that was related to the theme of this thesis was formulated as follows:

"*Parallel working activities often lead to dangerous situations"*

62% of respondents said they completely or partially disagree with the statement. PSA points out that there is a positive development for the statement, for in 2008 there were 58% who responded the same (RNNP, 2009). Simultaneous activities were not addressed in the 2010 report (RNNP, 2010).

[16] Risiko Nivå Norsk Petroleumsvirksomhet, in English; Risk Level Norwegian Petroleum Industry
[17] The search was done in Norwegian. For "simultaneous activities" (samtidige aktiviteter) the search gave no hits, but when searching for" parallel" the relevant topic was found.

2.4.3 Behaviour modification

This point is about how government affects the players' behaviour for ensuring that the established goals and standards are achieved .It can be argued that in Europe it is more common to use more soft methods than the more "daunting" methods used for instance in the U.S., where punishment is a normal reaction when actors do not comply with given requirements. The soft methods are mainly to put the responsibility in the hands of the stakeholders themselves, and encourage compliance with a formulated overall objective (Hood etc, 2001). Behaviour Modification or enforcement of regulations might be ranging from half-hearted attempts, to attempts to increase the level of awareness, often through the criminalization of certain types of behaviour (Hood, Rothstein, & Baldwin, 2001).

On the proactive side, consents are used. This means that for the actors to be able to operate on the NCS, they must meet certain requirements. New actors must apply for drilling permits and so will the established operators who want to explore new areas. This is what the PSA says about consents on their webpage:

"Operators must obtain the consent of the authorities in connection with important milestones in order to be able to continue their activities. The system has been established to ensure that:

- *appropriate status points are established in the operator's activities*
- *the authorities control central decision points in the operator's activities.*

Consents are granted in writing, clearly indicating the activity to which they apply.
The operator must facilitate the process so that the authorities can carry out proper consideration of the matter" (PSA 4, 2011).

Common reactive reactions or sanctions for violations of the regulations can be punishment, injunction, suspension and fines. These forms require legal basis and are associated with a number of terms to use them to safeguard the legal rights of the sanctioned party (Logstein, 2007). Through its practice and close relationship to the industry, PSA has established a number of non-statutory sanction ways and means in addition to the statutory remedies. This may be a request with notification of deviations from regulatory requirements and a request to correct these, invoice to a meeting with the PSA, warning to higher levels of management, supervision of selected areas, publication of audit results, warning that sanctions will be put to

use as well as notification to the Department of experiences with different actors in relation to health, safety and security (Logstein, 2007).

2.5 The Deep Water Horizon Oil Spill

The Deepwater Horizon accident served as a severe reminder to all regulatory bodies all over the world and to the petroleum industry as a whole. The accident illustrates how multiple actors in a complex industrial setting can make the wrong decisions and what impact it might have on people, environment and economy. Only a brief description will be given, and all information about this accident is extracted from the final report from the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, released 01.11.2011 at their website www.oilspillcommision.gov.

The Deepwater Horizon was an ultra deepwater, semi-submersible offshore oil drilling rig owned by Transocean. The rig was leased by BP and in September 2009, it drilled the deepest oil well in history at a vertical depth of 35,050 ft (10,683 m) and measured depth of 35,055 ft (10,685 m) in the Tiber field at Keathley Canyon. On 20 April 2010, while drilling at the Macondo Prospect, an explosion on the rig caused by a blowout, killed 11 crewmembers. The resulting fire could not be extinguished, and on 22 April 2010, the Deepwater Horizon sank. The well was not capped until 15. July, and left the largest oil spill in US history a fact. (Page 1-21)

The immediate causes of the accident were considered related to missteps and oversights by the three involved companies, BP, Halliburton and Transocean, and which the regulators lacked the necessary resources, authority and the technical expertise to prevent. The blowout occurred due to a failure to contain hydrocarbon pressure in the well. The report mentions three things that might have contained those pressures; the cement at the bottom of the well, the mud in the well and in the riser, and the blowout preventer. These immediate causes are linked to the root causes, which deprived the rig crew of the necessary safeguards to prevent the accident (p. 114-115)

"The well blew out because a number of separate risk factors, oversights, and outright mistakes, combined to overwhelm the safeguards meant to prevent just such an event from happening. But most of the mistakes and oversights at Macondo can be traced

back to a single overarching failure—a failure of management. Better management by BP, Halliburton, and Transocean would almost certainly have prevented the blowout by improving the ability of individuals involved to identify the risks they faced, and to properly evaluate, communicate, and address them. A blowout in deepwater was not a statistical inevitability" (p. 90).

The report states that the most significant failure at Macondo, and the clear root cause of the blowout—was a failure of industry management. Better management of decision making processes within BP and other companies, better communication within and between BP and its contractors, and effective training of key engineering and rig personnel would have prevented the Macondo accident. BP and other operators must have effective systems in place for integrating the various corporate cultures, internal procedures, and decision making protocols of the many different contractors involved in drilling deep water wells (p. 123).

The Deepwater Horizon accident demonstrates how the organizational complexity arises when several companies share responsibilities in assuring safety in petroleum activities. This is well illustrated by the following comment from the report;

"The individual contractors have different cultures and management structures, leading easily to conflicts of interest, confusion, lack of coordination, and severely slowed decision-making." (p.61)

The MMS (Mineral Management Service) is also criticized in the report for their lack of regulatory response to the changing conditions of the petroleum industry:

"Nor did MMS adapt its regulatory framework in response to significant ways in which the oil and gas industry has changed over time. In particular, the industry has witnessed a rise in specialized service contractors, such as Halliburton and Transocean that serviced BP at the Macondo well. When the lessee directly regulated by the government is itself not performing many of the activities critical to well safety, that separation of functions poses heightened challenges for the regulator. But there was no apparent effort by MMS to respond to those challenges by making the service companies more accountable" (p. 74).

Both the immediate and root causes of this severe accident, may be linked to the topic of this thesis. Simultaneous activities in a wider sense of the word were here an immediate cause for why the crew did not discover and correct the ongoing problems with the well; they were

busy with other activities while they should have been attending to the temporary abandonment procedure. The accident also illustrates how simultaneous activities might be seen as something not necessarily going on in present time on deck. A key issue in many simultaneous activities is the presence of many companies working together at the same site in an operational setting but not only that; decisions are made at several organizational levels and within different companies. The result of failure of management and communication in such complex organizational settings is made clearer through the Deepwater Horizon accident.

3. THEORETICAL PERSPECTIVES

3.1 Introduction to theoretical perspectives

The theoretical perspectives are chosen to suit the hypothesis founded in chapter 1.3 and illustrated by Figure 1 (See also figure 4). They are presented in a short form, and meant create a basis for the discussion on empirical findings.

3.2 Risk regulation

3.2.1 Why regulate?

There are several motives for regulating. The government may be affected by the bodies that are financially strong, and be affected by the regulated industry itself (Baldwin & Cave, 1999). Motives for regulation might be:

- A tool for political re-election.
- To ensure that the relevant product information is given the consumers.
- To ensure a minimum level of desired and essential services.
- In order to prevent undesirable behaviour of the various actors.
- To ensure allocation of scarce resources.
- To ensure fair distribution of society's benefits.
- To prevent or mitigate any injuries that may occur in different situations.
- To meet the needs of future generations (Baldwin & Cave, 1999).

Rationale behind the regulation is often the failure of the market. By this Hood (2001) means that the market does not regulate in a way that is good or sufficient enough. In such cases, an uncontrolled market does not serve the common good. As listed, there are many reasons to regulate. A combination of reasons often forms the basis for regulation (Baldwin & Cave, 1999).

2.2.2 Regulatory strategies

It is important to choose a regulatory strategy that fits the purpose. Otherwise the regulatory system might be difficult to justify if critics can argue that a different strategy more effectively could achieve the goals set for the regulation {Baldwin, 1999 #10}. A much used distinction between different kinds of strategies is drawn between the functionally based, and the detailed, deterministic strategy. However, a further distinction might be made. Baldwin& Cave (1999) separates the two main strategies into eight regulatory strategies:

Command and Control is a strategy that involves the use of influence posed by standardisation and the backing of these by criminal sanctions. This strategy is often called deterministic or detailed in its form. The strengths of this strategy are that the government can impose immediate and clear directions for the actors to follow. The government hereby states what behaviour is unacceptable; they exclude dangerous parties from relevant areas, and therefore also protect the public from danger. On the other hand, this kind of strategy might lead to a system not flexible enough for innovation and for adjustment to unforeseen settings.

Self regulation and enforced self regulation might be viewed as a substitute for command and control, or as self- administered command and control. *Simple self regulation* refers to a set of rules imposed by an organisation or association on its members or in some cases, a larger community. Self regulation might is termed *enforced* when overseen by governmental structuring. The making of "own rules" might lead to a higher commitment amongst the firms and associations engaged in the rule making process. On the other hand this strategy might promote the economical interests of the industry, and thus undermine the interests of the community, the environment and the workforce of the industry.

Incentive based regime is a kind of regulatory strategy that involves the use of negative or positive taxation, and works as an economic pressure against more sustainable behaviour. Such a strategy will demand less governmental involvement compared to a command and control strategy. It also allows the industry itself to figure out the best ways to manage and control the costs and other consequences of their activities. However, the degree of governmental involvement depends on the outcome of the strategy in compliance. It is also worth to note that these kinds of regimes demand a detailed set of rules, and the distinction between incentives and punishment might thus be less than it first appeared.

Market harnessing controls is a direct strategy where the goal is canalization of market forces by the use of competition laws, franchising, contractual agreements, permits or quotas.

Disclosure regulation means to force the actors to share critical information. Disclosure of information does not involve much governmental intervention. This strategy will often involve rules that prohibit the actors to give out false or misleading information about their products or activities, and rules that make publishing of this critical information mandatory. Baldwin & Cave (2009) calls this strategy "naming & shaming", and the strategy is regarded effective on actors that are dependent on a good reputation.

Direct action - Governments might use their resources to gain wanted effects by direct action or intrusion. Instead of setting standards and enforced these, they might for example produce the needed equipment for the purpose of reducing air pollution, and then lease this equipment to the actors of the specific field they are regulating. An advantage of this strategy is that protection might be gained in cases where small companies, especially small ones, don't invest in the needed measures.

Another strategy used is to regulate *rights and liabilities.* This strategy is used to encourage a desired social behaviour. Instead of using a command and control strategy, which gives the actors of the industry certain responsibilities, this kind of regulation gives the public certain rights. If the actors of the industry violate these rights they will pay the costs if and when they are sued by the public. In economical terms the effective level of deterrence will be the level that ensures that the actors will prevent damage up to the level at where the costs of the prevention will exceed the level of cost of a potential damage. The precise effect of such regulations is hard to determine. Gathering information of violations is demanding, the public might not get it or be able to take the cost of proving their demands for the trial.

Public compensation / Social insurance schemes. This strategy will encourage actors to behave in a certain manner by rewarding them when they can show good records, and punishing them when not. An example of this is the use of premiums in insurance. If an actor has no accidents on his record, the actor will be paid full compensation if an accident occurs. In the opposite case, the compensation will be lower and the cost of the insurance also higher due to the actor's performance record. This strategy might be seen as a form of command and control strategy, only with differences in the chosen sanctions.

Literature often makes a clear distinction between the detailed command and control strategies, and the functionally based self regulation. However, these strategies do rarely appear on their own in certain regulatory regimes[18]. One will often see the use of several strategies upon certain fields of industry (Sinclair, 1997) (Baldwin & Cave, 1999).

"Regulation is portrayed as top-down, cumbersome and resource intensive and voluntary standards as bottom up, relatively flexible, and particularistic. These classifications however, are obsolete. They not only ignore recent developments in environmental law, but also fail to reflect the complexities of regulation" (Sinclair, 1997).

3.2.3 Criteria for good regulation

In order to determine whether a specific set of paragraphs in the legislation is adequate and efficient concerning safety, some principles to measure it against is necessary. The purpose of these principles is to set some guidelines in the evaluation of the regulation surrounding simultaneous activities.

In the light of economics good regulation is often viewed as regulation that maximizes societal wealth (Baldwin &Cave, 1999). This should however not be the only criteria, because wealth for one actor might result in less wealth for another. Maximization of wealth as the only principle for regulation will never give any justification for any particular distribution of rights within a society. Nor does it provide any other ethical basis (Baldwin & Cave, 1999). Maximization of wealth is a principle that focuses on the *outcome* of the regulation.

Another way to determine whether a regulatory regime and its actions are good is to say something about the *process* under which it was made. Baldwin & Cave (1999) mentions five key tests that all are related to regulatory regimes legitimacy. First, the regulatory regime must have a *legislative mandate* which involves that the mandate is chosen by a legislative assembly. Challenges rise however when the government's intentions might be vague. Conflicts might also present themselves in the question about goals and purpose, because these will differ from different actor's point of view.

[18] Regulatory regime is a concept trying to catch all the elements included in regulation of a certain area. The complexity of the institutional geography, rules, practice and animating ideas that is associated with the regulation of a particular risk, are all elements of a regulatory regime (Hood, 2001).

A statute for example, may order a regulator to protect the interests of consumers but it may be silent on the balance to be drawn between industrial and domestic or large and small customer's interests.

(Baldwin & Cave, 1999:78)

Second, the regulatory regime should be *accountable* to and be *controlled* by democratic institutions. How to make the regulator representative for the task at hand and how to balance accountability and efficiency is a difficulty with this criterion. Third, *the procedures used by the regulator should be fair, accessible and* open to the public. This criterion also raises questions about the balance with efficiency. How democratic can a regulatory regime become before efficiency will suffer? What actors should be included? Fourth, the regulator should have the *competence* needed to evaluate and assess the complexity of issues they meet in their regulatory practice. It might however be hard for the public to determine if the outcome of a certain regulation would have been different if the regulatory body had made other decisions. There exists a general distrust within groups of lay people and experts; they "don't speak the same language". Securing legitimacy of regulation based on expert explanations may thus be hard facing the public opinions.

The last and fifth test to a regulatory regimes` legitimacy is about *efficiency*. This means that a regulatory body should implement the legislative mandate at the least possible level of input or costs. This claim relates to all of the other problems discussed above related to the mandate. Measuring efficiency is hard, especially when one might have nothing else to compare to, or the role as a regulatory body is mixed with those of other agencies and departments.

The five key indicators presented by referring to Baldwin & Cave (1999) is a long way coherent with the criterions presented by Aven & Renn (2010). They are presenting principles of good regulation extracted from the European Commission`s White Paper from 2001. Along with Baldwin& Cave they present principles as *openness*, *participation*, *accountability* and *effectiveness*. I addition, they also present *coherence* and *proportionality & subsidiary* as good principles. Coherence refers to the policy and actions being coherent and easily understood. Proportionality & subsidiarity means that throughout the whole governance process, the choice of the level at which the action is taken along with the selection of instruments use must be in proportion to the pursued objectives (Aven, & Renn, 2010).

Kaasen (1984) specifically addressing safety regulation in the petroleum industry, states that: "*For safety to be anything other than an internal matter for the practitioner of the business, one must have legal means to influence his decisions and actions* (Kaasen, 1984, p. 2).Kaasen (1983) concludes that legislation is necessary but not sufficient for assuring safety. It is, according to him, hard to judge the efficacy of legislation as an isolated factor. He sets two minimum conditions that the legislation will be an effective tool for safety:

1. The content of the legislation is reasonably clear.
2. Current actors have knowledge of the content.

Kaasen (1983) further states that one of the most important tasks of the regulation is to distribute different tasks of management between the actors.

3.3 Risk perception

Risk perception as a term belongs to the psychological perspective on risk, but is also discussed in the sociological and cultural perspectives (Boyesen, 2003). Human behaviour is primarily driven not by facts or what risk analysts and experts claim are the facts: it is driven by perception (Renn, 2008). Risk perception is much more than the probabilities and consequences, it is about "how people understand, perceive and manage risks and dangers" (Aven et al, 2008). Risk perception is also referred to as subjective risk. Research in risk perception literature provides no clear guidance for what is meant by the term or how risk perception should be measured. Previously, the cognitive aspects of risk perception were most emphasized, while the consequences and emotional factors have received more attention recently (Slovic, 2009, 2010). Most of the proponents in cognitive psychology, believes that perceptions are shaped by "common sense" reasoning, personal experience, social communication and cultural traditions. People generally follow a relatively consistent performance patterns when it comes to understanding risk and evaluation (Renn, 2008).

Risk perception is not a homogeneous phenomenon, since the term "risk" is ambiguous and controversial. People use the term differently, for example, experts add more weight on the probability component, while the laity in greater emphasis on the consequences (Sjöberg,

1999). According to Drottz-Sjöberg (quoted in Sjöberg, 1999) risk levels are considered lower with those who emphasize the probability than those who emphasize the consequences. Affects and emotions also has an important role in people`s risk perceptions. These factors are especially relevant when actors face dilemmas. In such cases people tend to resolve problems by addressing those areas that gives the strongest emotional signals (Renn, 2008).

3.4 Power

The Norwegian Petroleum Industry is a part of open market economy, and this kind of structure is designed to favor those actors that can deliver a product or service the most efficient way (Rosness, 2004). Simultaneous activities involve the actors struggling for staying in the game. Conflicting interests are inevitable and the concept of power might be useful to enlighten these issues.

As a part of the project "Robust regulation in the petroleum industry" mentioned earlier, Rosness et al (2011) have collected perspectives on power from several theorists, and presents a framework for analyzing circuits of power related to regulatory activities within the petroleum sector. And also as a tool for revealing potential nodal points within the oil industry where the authorities is not/is represented and the potential of these to influence safety related issues in certain situations. The theories presented are collected into four perspectives which enlighten forms in which power may be displayed:

1. *Power in action*- Addresses the things that actors do or may do to achieve their objectives when dealing with other actors' interests or preferences. This perspective is the most concrete one, because it enlightens the specific strategies and action used by the actors to gain their own interests.

2. *Power as a resource*- Power is here viewed as something actors have. Actors use this power to make other actors do things they otherwise would not do. *Power as a resource* is an important complement to the previous perspective, because some actors may have the power already implemented in their position as something they have, and therefore they can achieve their objectives by the use of power without displaying it through specific actions. The actors are well-defined; they are represented by individuals, organizations or governments.

3. *Power in collaboration and network*- This perspective might be seen as a conceptualization of the previous one, as where it focuses on how actors can achieve their objectives through the creation of collaborations and building of networks. The actors are no longer well-defined, they and their power is distributed in networks of actors. A central issue of this perspective is the control of individuals through discipline, which in turn may control behavior and also thoughts and emotions.

4. *Power in symbols and discourse*- Here power is not something actors has, and use to achieve their objectives. Power is rather something that resides in discourse, in our use of language and symbols. In a given domain of discourse, some statements appear to be meaningful and obviously true, but other statements might seem irrelevant. Power might thus exist in a hidden form rather than in what is stated explicitly. Rosness et.al. (2011) sees these four perspectives as overlapping.

4. METHOD

Taking the perspective of regulation and its implications for safety, might be characterized as a holistic approach to research. When considering the structure (in this case the regulatory control components) as guide or at least that the structure has the ability to guide, actors` behaviour, then the approach is of such art. This project was conducted with basis in qualitative data. These were extracted from literature and interviews with key- personnel in the offshore petroleum industry of Norway.

Three levels of stakeholders on the shelf were included; operator, rig company and sub-contractor. They were chosen to in the best way possible include the industry`s constellation of different companies. Three informants were interviewed within each company. In addition to the three levels of core stakeholders on the NCS, the Regulatory Forum was also interviewed represented by the PSA, SAFE (labour union), Industri & Energi (Labour union) and OLF (employers` association). Members of The Regulatory Forum[19] were chosen as informants due to their ability to influence the regulations and their specific knowledge. The Regulatory Forum is also a collaboration that gathers the three parties in the three partite collaboration, employee, employer and government, which stands as an important part of the Norwegian regulatory strategy and style. The specific associations from the forum were chosen because of their participation in the project "Robust regulation in the Petroleum Sector". The Shipping Company Association was therefore not included. An inclusion of them would have made it necessary to also include the Maritime Regulations in this thesis. That would have been interesting, but was found too expensive for a study of this scale. The interviews were all conducted from January to May 2011.

A total of 13 informants were interviewed. Based on the available time to conduct this study, 5 months in total, this was considered a reasonable amount. Instead of interviewing several individuals within each company, more companies could have been included. Several reasons made this alternative not an option. Firstly, gaining interest for this study with 9 different industrial companies would have been a challenge; several companies were already contacted before the three chosen ones agreed to attend. Secondly; to choose several informants within one company was seen beneficial because the understanding of the chosen phenomenon might be differing also *within* each company.

[19] The Regulatory Forum was established by the PSA. Webpage: www.ptil.no/regulatory-forum

Worth to notice is also that the presence of three levels of companies in simultaneous activities is not always the case. On installations that are both drilling and producing, the operator might also be the rig-owner. The three levels of actors were still included to see how the petroleum offshore regulations surrounding simultaneous activities were reflected within the rig-companies.

A qualitative method was found best suitable for this study due to this method`s ability to give an *understanding* of the studied phenomenon. A quantitative approach could also have been used, but it would not have given the same depth in the found material, and not given any room for reflections and discussions between the informants and the researcher. Research questions, and in this case the how- questions that gave the basis of the hypotheses proposed under chapter 1.3, and the wish to create an understanding, calls for an abductive strategy of research according to Blakie (2000). The abductive strategy`s goal is to describe and understand social phenomenon's, to discover the studied actor`s meanings and motives, and was therefore found suitable. The wish to understand and to seek meaning in the social actor`s life is based on a concept called hermeneutics. To choose a hermeneutic concept is to acknowledge that no science can be conducted without having a pre-understanding of how the world is construed. It might be seen in connection with social constructivism which seeks to reveal the social actors notion of the reality and from this say something about the world as it is. A scientific theoretic starting point like this might be termed descriptive. Hypothesis 1 is of such sort. However, hypothesis 2 and 3 seek normative answers and will be supported by theory to fit this purpose. The gathering of empirical data for this study was done by conducting interviews with 13 different informants as Figure 2 shows. Each informant from the three levels of the petroleum Industry is here termed with a code connected to the company they represent. This is done for use in chapter 5- Empirical Findings. Here each informant's answers will be outlined. Two of the informants have not answered all of the questions. One of the informants from the operator was not present at the second interview. The interview with the PSA was not completed, and there were no possibilities to get this done later. One of the questions is thus not answered by this informant.

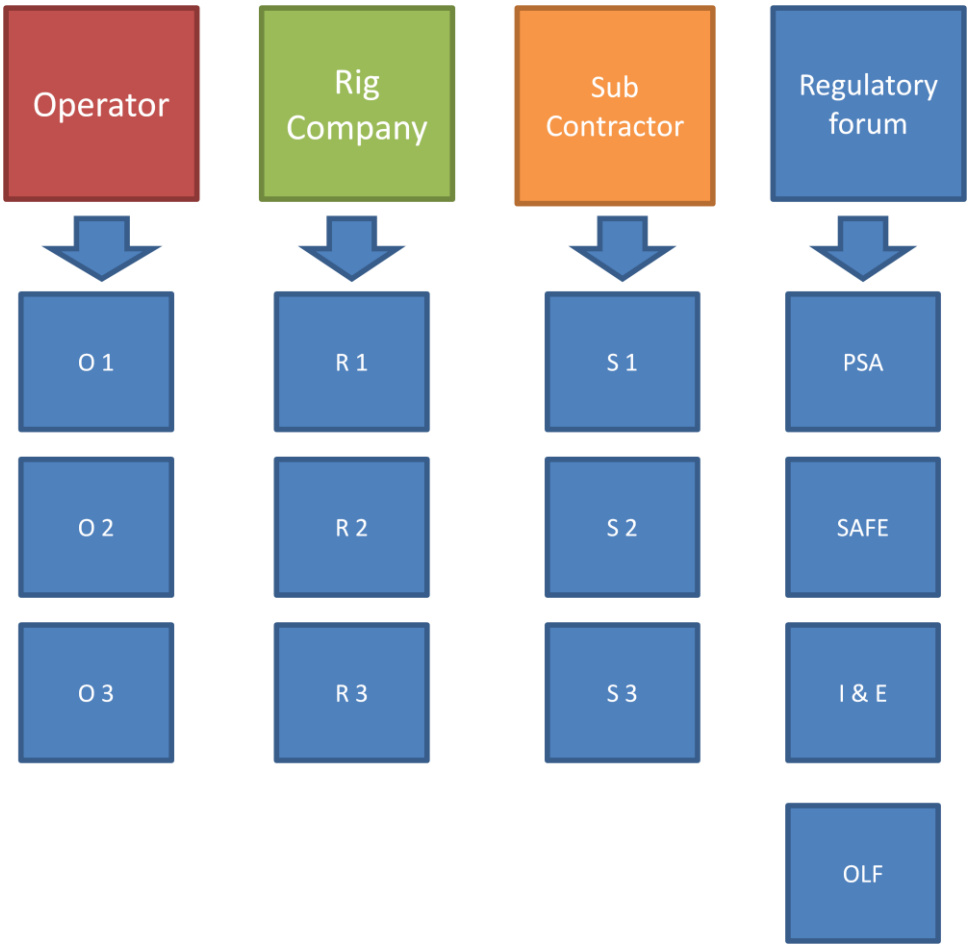

Figure 3- Informants

The informants might be characterized as key- informants (Andersen, 2006); they were chosen for their specific insight in the topic of this thesis; the petroleum industry and surrounding regulation. Informants with knowledge of both the PSA`s regulations and knowledge of internal management systems and practices surrounding simultaneous activities was sought for. The gathered information might be characterized as primary; it was gathered by and for this study only. The interviews were conducted one-to one, except from the interviews with the operator. Due to this company's wish, this was a group-interview.

This study may be considered a *case study*, where the petroleum industry and the regulatory efforts to control it is the case. Yin (2003) states that case studies is the right method to use when the phenomenon's to be studied not might be studied without considering the context this phenomenon occurs in. Cases might also be studied by seeking relevant documentation only, and not with interviews as in this case, but this was not found suitable because of the lack of theory and available documentation about simultaneous activities. Interests, elements of power and conceptual understanding is also empiric data that could not have been issued

without conducting interviews. The informants were not explicitly asked about relations of power or conflicts of interests. This information will therefore not be presented under Empirical Findings, but rather presented, analyzed and discussed under chapter 6- Discussion.

Interview is the most used method in gathering qualitative data in the social sciences (Briggs, 1986). The validity of data gathered in this thesis was secured through the use of a standardized set of questions. In the start of the project some changes were made to the interview guide, due to new experience and new issues that emerged through the interviews. The operator company was interviewed two times. The first one might be viewed as a pilot interview which contributed to the development of an interview guide. To ensure that all informants were given the same questions were it was necessary; these were contacted to give them the same questions.

Several issues arise when considering the validity of data gathered through interviews. First, interviews might be a tool for creating a social context in which a united understanding between the informant and the researcher emerge. Andersen (2006) states that an active approach, a situation where the researcher is a partner in a discussion and has a critical ground basis of his or hers appearance, will strengthen the validity of the interview. This because, he states, an active approach will help the researcher to further understand the informants point of view by challenging him with his own understanding and critical questions. Such a situation was sought created in the interviews conducted in this study, and might therefore be seen as a strength to validity. Some is still critical to the kind of social constructivism that interviews might create. Guldvik(2002) states that interviews construct more than it conveys meanings. All interviews in this study were however conducted with a sound recorder and these recordings were transcribed afterwards to minimise the risk of faulty interpretations of the material. Transcription is one of the most important tools in ensuring the right interpretation of interview material (Briggs, 1986). Still, it is not totally excludable that their answers might have been formed to fit the social setting they were created in. This might also especially be an issue in conducting interviews with key-informants. The important role they have in their organisation, the role that makes them interesting as informants, might make them more likely to give answers of poor validity (Engen & Ryggvik, 2005). This possible effect was sought reduced through offering the informants and their company's full anonymity in this study.

Group interviews, as in the case with the operator company, might also decrease the validity, because the setting could create a situation where the risk of so called "strategic" answers is increased (Guldvik, 2002). The informants from the operator company did however have positions at the same hierarchical level in the organization, and this together with them all sharing an interest in the topic of this study might be seen as a strength to the interview material`s validity (Guldvik, 2002). When presenting the results in section 5. Empirical findings, the informants' answers will be mostly outlined as direct citations. This is to limit the risk of faulty interpretations, and to strictly differing between what are the informants' words and what is not. Citations that are put together of several related sentences will be marked with three symbols of full stop between each sentence. Not all of the results that emerged will be presented. The informants were asked a total of 25 questions[20], and the transcribed material from these interviews exceeded 70 pages. Only the material that directly could enlighten the chosen hypothesis of this study will thus be presented. The literature was chosen to address the hypotheses founded in chapter 1.2, and the connections between theory, empirical categories, hypotheses and context is shown in figure 4.

[20] See Appendix for interview guide.

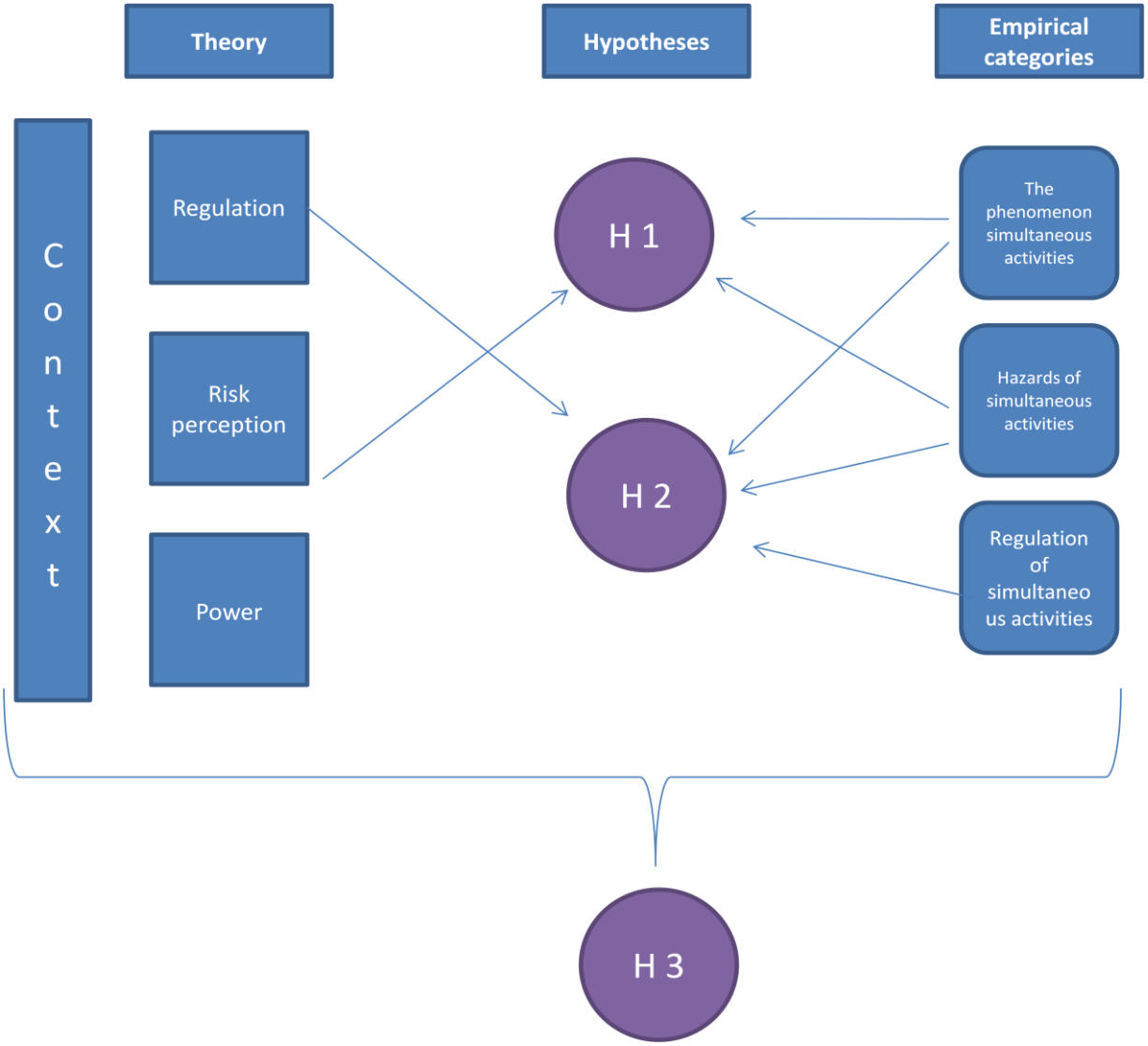

Figure 4- The connection between context, theory, empirical categories and hypotheses.

The figure shows how the hypotheses (H1, H2 and H3) will be addressed through the use of theory, context and empirical categories. The arrows and the bracket indicate what material that will be used for addressing the individual hypotheses. Other empirical categories could have been chosen given the extensive material that were gathered through use of the 25 questions in the interview guide, but these specific ones were chosen in order to address the hypotheses directly and concretely.

When addressing reliability, the factor of language should be addressed. Since the interviews were conducted in Norwegian and later translated into English, there might be

misinterpretations in the material. What may be said, is that the interviews were translated from Norwegian to English to the best of ability, and with the use of translation tools (Both the internet and dictionaries).The same is the case with much of the literature, and also some of the citations. What literature that is of Norwegian origin will be made clear through chapter 9- References. Responsibility in a study like this will also be related to the openness of the methods used in this study, so that this research could have been replicated by other students or scientists. (Full openness can however not be achieved when it comes to the informants due to respect for their anonymity). If the same results would emerge in other studies cannot be guaranteed, but this chapter of method along with the added interview guide used for the collection of empirical data, might create a more steady ground for responsibility of this study.

5. EMPIRICAL FINDINGS

This chapter will contain the answers given by the informants during the interviews. They will be categorized as follows;

The phenomenon of simultaneous activities

This category contains the informants' reflections upon the phenomenon as a whole, and on the term.

Regulation of simultaneous activities

Here the informants' opinions on the regulatory control components towards simultaneous activities will be outlined.

Hazards of simultaneous activities

This category contains the informants' reflections about specific hazards related to simultaneous activities.

The answers that were given will be discussed later on, under chapter 6.Discussion.

5.1 The phenomenon of simultaneous activities

How is the phenomenon of simultaneous activities reflected amongst the actors? This question was asked to see whether there exists some sort of united understanding about what is actually is, and what hazards that are connected to it. The hazards will be treated under section 5.2.

5.1.1 Operator

The informants from the operator company were interviewed two times. During the first interview a general discussion about this study took place, and statements of importance from this first interview will be outlined under. Three informants were present at this interview, but only one had explicit reflections upon this first category. The informants were termed O1, O 2 and O 3.

Interview 1

O 1 mentioned the importance of explicitly differing between the terms simultaneous *activities* and simultaneous *operations*.

" For me it is somehow a widely different matter. Simultaneous activities will typically be when you have a diver in the water, and then you cannot do lifting procedures above them. That is a simultaneous activity. While I feel that there is something else that is of high importance to us, and that is this with us drilling, rebuilding the installation and doing production and maintenance, which is simultaneous operations which you can choose whether you are going to do simultaneously or not."

Interview 2.

This time there was only two informants present at the meeting.

O 1: *"Simultaneous activities are what happen on an installation when we e.g. are drilling, producing and rebuilding it. If you have more than one of these then it is simultaneous activities. If you have a production platform in the North Sea, and that is what it is doing, it is its main activity. And then you have this with drilling, then you would have two activities. If you then do well intervention, you`d have three activities, and if you have a fourth activity which is that big, well, how this is defined…"*

O1: *"If you build a new module on a platform, then this would be a fourth activity and maybe some of the maintenance activities as well could be added as one.*"

At this point the informants reflected upon whether for example lifting activities and helicopter take off and landing could be some sort of simultaneous activity.

O 2: *"No, that will not be a simultaneous activity, unless we for instance are talking about lifting a large module. We know most about simultaneous activities in cases when we are doing drilling and production at the same time. This is regulated fairly strict within our systems since the risk level is significantly changed when doing this at the same time."*

Here the informants were taken back to Interview 1 where O 1 said that there is a difference between simultaneous *activities* and simultaneous *operations*, and they were invited to discuss this again.

O 1 says he is unsure about whether a difference is there. O 2 stated:

I think it`s the same, but in my world an activity is something a bit smaller than an operation. Activities are more micro, and operations are more macro. I don't think that the regulation differs between these, so I think that when you use operations *in English, then it will be the same as using* activity *in Norwegian."*

O 1: "*I agree, when we talk about simultaneous activities then it`s really operations we mean. Because you may say that the activity level at the installation is much bigger and much more detailed. You`ll typically have one hundred work permits in one day, while you might have four work operations."*

O 2: "*I think it `s very difficult to differ between the terms. I have never thought about it before".*

5.1.2 Rig Company:

Tree different informants were interviewed with the rig-company. They were interviewed separately, and will be termed informant R 1, R 2 and R 3.

R 1 does not go into specific details when asked to reflect upon the term. He states:

"I think about different companies in at the same area. The drilling is in center, and then there are several actors around there, service suppliers. If I for instance work in the pump room then there could be people around me working with different things. That might also be simultaneous activities, only in a smaller scale".

R 2 with the rig company was from the UK. He used another term to describe simultaneous activities; dual activities;

"*Basically anything could be dual activities. If you do two things at the same time then it is dual activity"*

R 3 informed about their work which involved work for an operator where their drilling module is skidded over a production facility. He had another perspective then the two previous informants of his company, and said that simultaneous activities are not very common in their scope of work:

"When I hear simultaneous activities isolated as a term, I think about several disciplines at the same place at the same time, but they are all working with one operation, drilling. We are for instance working with wire line right now, and then we have several different companies present. Some have gunners and other tools and all this, but they are all involved in one activity. So there is only one activity on all the way."

5.1.3 Sub Contractor

The informants will be termed S 1, S 2 and S 3.

S 1 did not have a specific definition regarding simultaneous activities, but stated:

"First and foremost I think about coordination of things that happens in operation. Some things can happen simultaneously and some things cannot".

S 2 differs between the term activity and operations and seems to prefer the term operations:

"In our case simultaneous activities will be activities that are occurring in parallel. Or operations are maybe what one first would think about when hearing the term. It involves something that we practically are to do in the field, and that there is activities close by that might affect the outcome of our operations".

He reflects further about this comment when stating:

"*SIMOPS is by the way the word we use for this. You will probably have more responds with your informants if you use this term than if you use the term simultaneous activities.*"

S 3 had the following to say about the phenomenon and term of simultaneous activities:

"*Simultaneous activities are what is says. But for our case, at top site, it is very topical in relations to auditing stops. Then there is very much going on per square feet to put it that way. And it will demand more coordination activities in the whole line of command."*

5.1.4 The Regulatory Forum

This forum was represented with one informant from the two labor unions (SAFE and Industri & Energi), one from the employers association (Oljeindustriens landsforening, in short; OLF) and one from the PSA.

SAFE

"Yes, guiding words: busy, complex. One does not know what happens elsewhere. It demands thorough planning, and structuring of the operations."

Industri & Energi

The informant started with describing the situation they right now are struggling to handle as a labor union and that is the case of the operator companies wanting to do much work at the same time. In order to do so, he describes, they have to expand the working hours by making someone work night shifts. People don't want to work night shifts, but would rather do that

than co-sleeping. "*Simultaneous activities for us are what I just have outlined for you, when people have to co-sleep because of too many activities going on at the same time"*.

He also mentions that simultaneous activities could be anything regarding the functionally based regulation*; "It is not easy for people to know what simultaneous activities really is, all and nothing might be applicable"*

OLF

This informant told about his long experience within the field of regulatory development, and stated the following about simultaneous activities; *"What I can say about simultaneous operations is that it always or very long have existed. And since it is regulated it there must have been some problems connected with it".*

PSA

The informant says there are many sides to this phenomenon. He mentions that development in the sector earlier was done in sequential steps, but that the case is different now:

"They projected, fabricated, installed and then started to produce…now these things is overlapping as they for instance might be projecting while building an installation"

He mentions another side to it also*: "Also there is several operations going on at the same time, for instance that one now is doing maintenance together with drilling and production"*

5.1.5 Summary

This table will show how the answers are distributed amongst the informants when they were asked to reflect upon the phenomenon of simultaneous activities. The table will only give a summary and not a complete image of the discussions.

Operator	Rig Company	Sub Contractor	Regulators forum
O1 - Differs between simultaneous activities and simultaneous operations in interview 1, unsure in interview 2	R 1- Anything could be simultaneous activities. Uses the term dual activities.	S 1- No specific definition. States that some things can happen at the same time, and some cannot.	PSA- Two main sides of simultaneous activities. One at a planning stage of the activities and one at a operational stage
O 2- Sees simultaneous activities as e.g. drilling and production occurring at the same time on one installation. Unsure about differentiation between simultaneous activities and operations as mentioned by informant 1.	R 2- Differs between simultaneous activities in small scale- e.g. several different activities in pump room, and big scale; drilling and other activities surrounding it.	S 2- Simultaneous activities as something practical happening on deck. SIMPOS is the term used.	SAFE- No specific thought s about what simultaneous activities is or is not. Sees it as something busy and complex. Demands thorough planning and coordination
O 3- No comment	R 3- Sees simultaneous activities as not so relevant for drilling modules, because everything revolves around one activity; drilling.	S 3- Sees simultaneous activities as different activities occurring at the same time.	I&E- Focuses on the results of simultaneous activities. Workers having to co-sleep due to many simultaneous activities.
			OLF- Simultaneous activities as something that has always existed. Focuses on new challenges, as maintenance of aging installations.

Table 1- Summary of results chapter 5.1 - The phenomenon of simultaneous activities

5.2 Hazards of simultaneous activities

How did the actors then perceive the hazards of simultaneous activities?

5.2.1 Operator

The hazards were not addressed in the first interview; all answers were given during interview 2 about this topic.

O 1 says that there are hazards connected to different cultures and language on installations in simultaneous activities.

People say that they know the language, and then it is revealed that they cannot through random conversation with people. And the case about culture is also important. Not everyone is used to using protective equipment for example. Different requirements on different platforms and people may misunderstand how they should do the job, this might be a challenge. There are many different suppliers, many of which have not been on the platform before, and that is there only a short time.

O 2 also mentions that the way we do things in Norway might be challenging in the years to come.

"One of the major challenges we will have in the years to come is that we are to rebuild on the move. We have a regime in Norway where we actually build a lot more on the move than they do on British shelf, for example. When they have major modifications they choose to close down and they start up again when they're done"

5.2.2 Rig Company

RI says that the biggest hazard is the one connected to hurting somebody by doing it simultaneously. He does not say anything more about the hazards; he is occupied with describing how things can be managed in order to reduce the risk.

"You cannot do simultaneous activities if there is any safety risk involved. Therefore you have to do a task risk based assessment on dual activity, and if there is any sort of like possible complications where one is going interfere with other, then you can't. You have to implement the necessary precautions to limit that risk. If you can`t implement enough of those safety precautions then you can't do it, because you can't risk it."

Informant R2 tells about how managing the Work Permit system could be challenging.

"The management has to go through a lot of Work Permits each day, maybe 50. There is a lot going on all the time on the whole rig. Especially during maintenance stops. It is only in these meetings that they can discover what could go wrong because they are the only ones having the whole picture. So if they haven't paid well enough attention some activities might collide.

It might be very much information for them to handle and much responsibility thus lies on them"

The informant was asked whether there exists some sort of computer system that handles the information that comes in through the work permits. He then replies:

"No, these are treated manually in the daily meetings".

Informant R 3 says this about the hazards:

"Several wells living their own life; that is quite complicated to handle. And with drilling and production there is also a case with us not having the competence on production. If something happens then the information might pass us. One pool of competence against another might easily be an issue."

Later in the interview he says:

"I don't see simultaneous activities as a problem. My experience with this tells me that it doesn't constitute any great risk. I see no point in removing it or anything, there are clear benefits of it, better income and more continuity. It just has to be managed.

He reflects further on hazards and says that the greatest risk is the possibility of explain away. He then refers to the regulations (See comments from informant R 3 under the empiric category addressing the regulations)

5.2.3 Sub Contractor

Informant S 1 says this about the hazards:

"*The dangers are probably not the greatest just at the time the operations take place. What has happened on the field before we arrive, that might affect us as players as we are coming in like a little bit of a big puzzle is probably a greater hazard. The question is then if someone has thought about the whole picture, about things that we don't have the prerequisitions to think about in our small piece of the puzzle"*

S 2 asks a counter question when asked about the hazards:

"How big a risk do you think that today's level constitutes? I don't think that it is considered a major risk. I don't see SIMOP`s as an element that they are quick to address, and that is because we work in a way that automatically accounts for this"

S 3 mentions the effect of several stakeholders in one place like on an installation offshore:

"I think that if one peels the onion, then much is related to the sub-sub suppliers, all with their own agendas. It`s not necessarily a "pang- combination", or maybe it`s just that it is?"

He also mentions the recent Adecco scandal in Norway where outsourcing health care has lead to unsafe conditions for patients:

"There you have what happens if one only focuses upon economy. The criteria's of success is compound"

He says that with an increased amount of companies, and an increased amount of personnel, there will be an increased risk. But he also mentions that a collection of competence like this might be good, and thus there are both benefits and drawbacks with different stakeholders.

He mentions another aspect:

"By reducing the simultaneous activities, it is obvious that the risk will be lowered. One does not want too many simultaneous activities, due to the possibility of then loosing oversight"

5.2.4 The Regulatory Forum

PSA

Informant not available (See chapter 4, Method).

SAFE

The informant has this to say about the hazards of simultaneous activities:

"It is this with oversight that springs to mind. One actor might not know what the other is doing. I think about the lack of competence, knowledge and oversight, but also conditions like power relations and conflicting interests. One should not take for granted that everyone will agree upon what focus to have. It might for instance be that a sub contractor is more occupied with thinking about how many billable hours that can be squeezed from the task ahead, than to be concerned about keeping the work safe"

I & E

This informant thinks that the biggest challenge is to keep the overall picture clear for many workers.

"The majority of workers on an installation do not have the overall picture. Maintenance men were earlier usually employed with the operator, and then the continuity and the oversight better secured. But then this trend with core business gradually came into force, and of course this saves money. But who ensures continuity? "

He also mentions that workers in the service industry, might get one day`s notice about that they are needed on an installation.

"They have never been there before, and will probably never come again. How much time do they then have to prepare? "

The informant also reflects upon the installations manager`s opportunity to abandon procedures on simultaneous activities when this is needed to get things done:

"But this is of course hush-hush. You won't find such information in any papers. And in general it all goes well. There develops a culture for abandonment of procedures, and this goes well for a long time, but suddenly something goes wrong"

OLF

"Seen with the eyes of a regulatory worker who have had hands-on experience with the regulatory developments, there have not been any big steps on this area because it has been viewed as a major risk. What is a much bigger challenge than what you are asking about now, is this with maintenance and modifications"

5.2.5 Summary

Operator	Rig Company	Sub Contractor	Regulatory Forum
O 1 - Hazards connected to different cultures and language on installations in simultaneous activities.	R 1- Hazards connected to hurting somebody while doing simultaneous activities. If risk is increased by doing simultaneous activities then it can't be done.	S 1 - The dangers are probably not the greatest just at the time the operations take place.	PSA- No comment- informant not available (See chapter 4. Method)
O 2 -Hazards connected to rebuilding on the move	R 2 -Managing the Work Permit system.	S 2- Doesn`t think that simultaneous activities is considered a major risk	SAFE- Loosing oversight. Power and conflicting interests amongst actors.
O 3- Informant not present	R 3- One pool of competence against another might easily be an issue. Several wells living their own lives. Doesn't see simultaneous activities as a major problem, it doesn't pose the greatest risk.	S 3 -Sub-sub suppliers, all with their own agendas poses a risk. More actors, greater risk.	I & E- Lack of opportunity to prepare for many service workers make them unable of getting good enough oversight. Regulations make it possible to abandon procedures.
			OLF -Simultaneous activities have not been viewed as a major risk in the past years.

Table 2- Summary of results chapter 5.2- Hazards of simultaneous activities

5.3 Regulation of simultaneous activities.

The informants were asked to reflect upon the regulation surrounding simultaneous activities. Three main areas of the questions asked under this category will be highlighted; pros and cons of the regulation, how the actors think that the lines of responsibility in simultaneous activities is defined from Regulators side, and how different interpretations of the regulations might affect safety. Most of the informants (11 out of 13) did not know the actual regulation, guidelines or other efforts of control given by the PSA in relation to this phenomenon, so most discussions evolved around the regulations in general. It will be made clear where the informants are talking about the specific regulations for simultaneous activities. Questions about the regulations were asked to see whether the regulations might be set in connection to the perception of the phenomenon of simultaneous activities.

5.3.1 Operator

Interview 1

O 1 had knowledge about the actual regulation surrounding simultaneous activities, and said the following:

"*That paragraph about simultaneous activities is formulated very general, so one will rarely refer to that paragraph. There are only a few lines there, so the paragraph in itself is actually not very usable in everyday work"*

Both O1, 2 and 3 agreed that the goal-oriented regulation is something worth keeping, and said that the positive sides of such a regulation are that it promotes efficiency and innovation. O 2 also had the following comment regarding the positive sides:

"*It is also positive that the government now is more interested in looking at our systems and the way we work, rather than coming in and stopping our activities by referring to some detailed paragraph"*

The informant also stated that the regulatory style in Norway is best suited for small conditions, because it is based on trust, and not every culture is according to him used to such an arrangement.

Other negative sides were also mentioned by informant 3:

"*And then there is this with reducing the risk as far as possible. If one should do that, then we would have to stop all our activities to be in compliance. The PSA can always say that we could have done more".*

O 1 reflects upon the challenges of the industry in the years to come, and mentions the aging installations and the need for maintenance and modifications. He says:

We will be building much more while we move in the years to come, and this will be our biggest challenge ahead us. The question is whether we have regulations that reflect that".

Interview 2

The answers given during this interview was very similar to the answers given during the first one. O 2 had however an additional comment to the negative sides of the regulation. And that was the practicing of the regulation from the PSA:

"If we have reasonable officials, the regulations will not be a problem. But individuals within the PSA might affect the processes in an unwanted direction. "

During this second interview the lines of responsibility were also discussed. The informants were asked about whether or not they saw these lines as clear and well-defined in the regulations. Informant 2 told about a user survey done in 2004 about the regulations for the Petroleum Industry. The informant said that one of the main conclusions of this study was that the supervisory responsibility was unclear. Informant 1 comes with an example of a case where their company rented a rig from a drilling entrepreneur. He said that one of the things they do is to check the maritime certificates given by the Norwegian Maritime Directorate.

"So we check that they have the necessary certificates. And after doing so in this case, we had an understanding of that we really had followed our supervisory responsibility. But that was not good enough for the PSA. They wanted us to go deeper, and check the quality of the certificates also".

The informant blames this case on the regulations and says:

"*When an incident occurs, we will be in trouble no matter what we have done because we have this goal-oriented regulation."*

Interpretations of the regulations were also discussed, and the informants were asked about whether or not it could affect safety if different actor interpreted the regulations differently.

O 2 said:

"It is not dangerous if actors see things a bit differently. One can maintain the same safety level even if some have different interpretations". O 2 agrees and states:

"That will not be problematic. It would not be possible to describe all operations in detail from a governmental level"

5.3.2 Rig Company

None of the informants from the rig-company had knowledge about the regulations directed towards simultaneous activities. Most discussions therefore evolved around the regulations in general.

R 1 stated this about the positive sides of the regulations and the regulatory style:

"Their style is to set a minimum standard, for instance for bits of equipment. You can rely on the equipment to be a certain standard. You know it can be good enough; these standards have to be set in the beginning of rigs operating in the Norwegian sector. High standards are good. Standards in Norway are good and high, and better than in UK."

He was also asked about whether or not different interpretations of the regulations might lead to affected safety level one way or the other. He then replied:

"Oh, yeah. People will interpret things to their best advantage, they will. And people will work at the lowest standard you allow them. That is why things need to be very, very clear and precise so it cannot be taken to peoples own advantage"

R 2 had nothing to say about the positive and negative sides of the regulation or about the lines of responsibility the way this is treated in the regulations, but said something about possible different interpretations of the regulations:

"Different interpretations of procedures might be challenging, but still, it is always our (the rigs) procedures that applies. There is always held meetings so that everyone knows that. Everyone follows the same procedure."

R 3 says this about the positive sides of the regulation in general:

" The regulations is not so specific, and it allows us to determine more ourselves. And that is good; otherwise the development would stagnate technologically".

He thinks that the negative sides are connected to the regulations lacking ability to follow the development. He brings out an example of this:

"If there for instance is a change in the equipment used, the regulations are far behind in catching up on this. That is a challenge. HTHP[21] wells for instance are something that the NORSOK is practically blank on. It is simply moving to slow. It seems like the regulations is not meant for updating, otherwise there should have been employed far more people working with it"

He also talks about the regulations being vague, and comes with an example:

"It is almost like in the Road Traffic Act where you are told to regulate your speed to the surrounding conditions. If you hit the ditch, you have made a mistake, and it will be your fault anyway. I think that this style of regulation is too naïve, at least when one operator holds 70% of the market. It might be that they will interpret the regulations just the way they want, and dangers may be connected to that".

This informant also calls for more visibility of the PSA, and says that they should be present more of the time and also states:

"*They give an enormous trust to the industry, and it is not sure that they should".*

He says the following about the lines of responsibility:

"The operator is the licensee; it is them that have the permission to do work on the shelf. We are not allowed to do anything. And it is the operator that plans. But when we are out doing our operations, then it is the OIM [22]that has the responsibility".

He is also asked about different interpretations of the regulations, and he gives the following comment to that:

"There will be challenges in such cases, because a human is created in such a way that he will always have his own opinion. The result might be many different opinions about the same regulation, all dependent on what interests one has and where one sits".

5.3.3 Sub Contractor

S 1 is positive to the goal-oriented regulation in the sense that it is open to differences between different actors:

The advantage of the regulations as they are today is that it takes into account that companies in this industry are quite different. Very detailed regulations would have lead to a lot of cases where we would have to say "not applicable" in our management systems, and we might also have been forced to do things that was not very relevant to our company".

Amongst the negative sides he mentions the demands for documentation and how this burdens the company:

[21] High Temperature High Pressure wells
[22] OIM- Offshore Installation Manager. Leader from the Rig Company

"There is so much demands connected with reference in documents, that I sometimes feel like the things that are really important to communicate is lost. All I do is working on documents that show your clients that we meet all the QHSE[23] demands. These documents are what we have to use in practice also, and they end up containing a lot that is not interesting for the persons on deck".

The informant also sees the regulations as a bit unclear, and complains about no one really ensuring or giving a good recipe for ensuring communication to the persons in operation. He sees this as the most important thing in ensuring safety.

"All the time we spend on the paper mill; does it necessarily pay off in an increased level of safety out there? I don't think so".

S 2 says this when asked about the positive and negative sides of the regulation:

I have not been much involved in handling the regulations, so I have to be honest and say that I cannot give any statement on that.

The informant thinks that he does not know enough about the regulations to give a statement, but when he is asked about different interpretations of the regulations, and if this might create problems, he replies:

"The answer to that must be an undivided yes. It is no doubt that conflicts of interests might occur about different interpretations if one has a goal-oriented regulation".

He modifies this argument when connecting it to simultaneous activities, and further states:

"But in the case of SIMOP`s, experience matters a lot. And if one presupposes that the operator and everyone else has enough of that, then it is not unnatural to think that one even with goal-oriented regulations would manage to safeguard this after all. At the same time such regulations will provide flexibility enough to work good in parallel also".

He does not think that the lines of responsibility is unclear in any way, and states that these things are handled through contracts with their clients.

"The responsibility is ultimately placed on the operator and the rig-company. I don't feel that this is an extensive problem. It is very obvious".

S 3 has no comments to the positive and negative sides of the regulations. He does however have comments concerning lines of responsibility: *"I think that the lines of responsibility are reasonably clear. The operator sits with the main responsibility, while we have responsibility for our sub contractors again, and so on".*

[23] Quality, Health, Safety and Environment

The informant also comments on different interpretations of the regulations and confirms that it might create problems according to safety, but also says that he cannot recall that this has been a problem within the topic of simultaneous activities.

"Yes, I would suppose that different interpretations can create problems. A norm is a norm, and it should preferably be mostly constant. Unclear norms might create insecurity amongst the actors. However, I cannot recall that this has been a problem within simultaneous activities".

5.3.4 The Regulatory Forum

SAFE

The informant from SAFE says that he is uncomfortable with the level of goal- orientation in today's regulations. He thinks that too much is placed in the industry`s own standards. He also thinks that the goal-oriented regulations might impose shortcuts regarding safety in pressured situations.

"If you have a safe and good approach to HSE, then you would interpret the regulations as they stand, but in settings where a company or individuals are pressured, the goal-oriented regulations opens up for shortcuts"

On the positive sides he answers:

"As long as this topic with simultaneous activities is addressed, it is positive. They are at least aware of the problem, and try to make the industry work on it".

When asked if different interpretations would create problems, he replies:

"Oh, yes definitely. Also within the PSA. The industry complains about this that when they come to them they get different answers depending on who they address. And that is how it becomes with goal-oriented regulations. Everything depends on what glasses you put on before reading the regulations".

Industri & Energi

When asked about the positive sides of the regulations, this informant says:

"At least this topic you are referring to is addressed in the regulations"

On the negative sides:

"It is hard to understand the regulations, they are too diffuse. And they are often referring to standards owned by the industry. Many of the standards are also in English, and many cannot read that".

The informant also has some reflections upon the possibility of problems related to different interpretations.

"It will always be a problem for us when the regulations give room for interpretations. The employee might then always be parked when disagreements occur. The employer then sets the standard. Only regulations through law can control such conflicts of interests."

He also says something about the lines of responsibility.

"I think that these lines is pretty clear, can`t remember that this has been a major problem. But how responsibility is exercised is in power situations is something else. It is always the company that orders the work done that decides everything"

OLF

The informant from OLF is positive to the goal-oriented regulations.

"From our point of view here in OLF, we will stand rock solid for goal-oriented regulations, use of norms, standards, best practice and our own OLF guidelines. It is a challenging model, but as we say to everyone that doesn't agree with us- show us a better system."

On the negative sides he thinks that the lines of responsibility should be made clearer and states that it is not always the operator that has most of this. He also thinks that reflections upon modifications and maintenance should be more highlighted in the regulations due to the new challenges in the industry facing aging installations.

On responsibility he also mentions the responsibility of the Steering Committee. These are the silent interesents of this industry, and must not be forgotten. They have responsibility both economically and in criminal court if anything goes wrong, he says.

The informant is also occupied with differing between responsibility towards public court and private court.

"I am talking about public court responsibilities and not those of private matters, because there is a cat-and-dog fight going on all the time".

PSA

On the positive side this informant has the following to say:

"We think that when considering the HSE level from the start and up until now, there has been a positive trend. The HSE level is generally high. Diving is a good example of this. We think that the regulations have been a positive contributor to this"

He also mentions that good arenas of cooperation has been important, and mentions the actors in the three partite collaboration and Collaboration for Safety as examples. He says that the regulation sets absolute demands, and that the guidelines give direction. About the goal-oriented regulations and placement of responsibility he says:

"Those who are best able to evaluate the technical solutions are those who will use the regulations. We have placed the responsibility of the players. We have clear rules on responsibility".

"Internal control in the petroleum industry has been a good contributor to safety. It's a bit controversial because many say that this is privatization of the authority; that the authorities are the ones that should ensure that others comply with the regulations. We say that that is nonsense, it is they who decide whether they will choose the top or bottom shelf. If they choose on the bottom shelf then it is not we, as the authority who should get more work, it's them"

When addressing simultaneous activities especially he says:

"The operator has responsibility for simultaneous activities because they determine the level of activity. It is a subject we're very concerned about. Statoil, have been reorganization while running the organization, this is also simultaneous activities. We have had much dialogue with them in relation to this."

He also says that the market has changed and that is why simultaneous activities is not regulated the way it used to be:

"We constantly look for solutions that are less subject to consents. Previously, we had very many of these. It is not common to way up the business like this anymore; precisely because of these simultaneous activities that you mention."

About the negative aspects of the regulation he says:

"I actually think we've gone too far. It is this with good and bad economical times. Having a functional set of rules in times of good economy, where everyone will do their best then this legislation is very facilitating. When you work at the other end and you want to start saving money, then you can say that there will be little more difficult to have goal-oriented rules. Then you will look for opportunities for simpler solutions, The actors may think that they have good enough solutions and we as an authority might think that they`re not. Hard to argue about the colour should be blue or red, easier to just say that it should be blue, or you're in violation of the regulations. It is power that prevails in relation to the employee and employer. And then it's also okay to have a regulatory framework that is clear in order to protect the employee"

5.3.5 Summary

Operator	Rig Company	Sub Contractor	Regulatory Forum
O 1 Positive to goal-oriented style, paragraph on simultaneous activities to unclear to use though. Negative to practicing of the regulations in general. Unclear lines of responsibility, too much placed on operator. Different interpretations not a problem.	R 1 Only positive things to say about the regulations in general, no negative sides. Different interpretations a problem, people will work at the lowest standard allowed. Lines of responsibility is clear, everyone has responsibility.	S 1 Positive sides are connected to that the regulations might fit to every company. Negative that it demands a lot of documentation. Cannot recall any problems of interpretations differing. Lines of responsibility, does not know the regulations.	PSA Thinks that the regulations have made the industry safer during the years. Places responsibility very clear. Negative sides: thinks that the regulations might have gone too far in degree of goal-orientation. Describes that different interpretations might be a challenge.
O 2 Positive to goal-oriented style, negative to practicing. Unclear lines of responsibility, too much placed on operator. Different interpretations not a problem.	R 2 No comment on positive and negative sides of regulations. Different interpretations might be a problem, but the rig company`s procedures always applies for their jobs so it is covered there.	S 2 No comment to positive and negative sides of regulation. Different interpretations might be a problem, but not in the case of simultaneous activities. Lines of responsibility are very clear, most of it placed on operator and the rig-company.	SAFE The positive side is that simultaneous activities are reflected. He negative sides are that the regulations are goal-oriented; creates insecurity for individual actors. Different interpretations a challenge and especially in critical times. Clear lines of responsibility, but might be a problem in pressured situations.
O 3 Positive to goal-oriented style, negative to practicing.	R 3 Positive sides of regulations are that it does support development. The negative sides are that the standards are not able to follow the technological development. Wants the PSA to be more visible and clearer in their regulations, thinks that it is naive to let the industry do all the steering itself.	S 3 No comments to positive and negative sides of regulation. Lines of responsibility are clear-main responsibility on operator, and subcontractors for their subcontractors and so on. Unclear norms might be a problem, but doesn`t think it is the case with simultaneous activities.	I & E The positive side is that simultaneous activities are reflected. The negative sides are that the regulations are goal-oriented, creates insecurity for individual actors. Clear lines of responsibility, but might be a problem in power situations.
			OLF Positive to goal-oriented regulation. Negative sides are that the lines of responsibility should be made clearer; too much is placed on operator. Wants more focus upon aging installations in regulations.

Table 3- Summary of results in chapter 5.3- Regulation of simultaneous activities

6. DISCUSSION

The overall objective of the discussion is to address the problem founded in chapter 1.2. This part will thus connect theory and empirical findings in order to answer the hypotheses as illustrated in Figure 4.

The general impression is that the actors have very different views in reflections around the phenomenon of simultaneous activities. There exist no clear distinctions with any of the actors about what simultaneous activities are or are not. The views were also different within each company. Several of the informants gave this statement: *"For us, simultaneous activities are…*" which indicates that the informants acknowledge that this phenomenon could mean different things for different actors. SIMOP, dual activities, parallel activities, simultaneous activities, and simultaneous operations were all terms used amongst the informants to describe this phenomenon. The hazards connected to simultaneous activities were also viewed differently, and varied from an emphasis on culture and different languages, to having too many activities going on and thus loosing oversight and needing to co-sleep. Those who had the most describing reflections around the phenomenon were the informants from the operator company, and the informant in the Regulatory Forum from PSA .These findings indicate that the actors` risk perception might be affected by the place in which they stand.

The differences between the informants might be there of several reasons. It could be that the subcontractor and the rig-company rely upon the operator to address this. This was also found when the informants were asked about responsibility in simultaneous activities; most of them placed the most of the responsibility on the operator. This might be the answer to why the informants from the rig-company and the sub contractor rated the hazards as low, didn't know the regulations or standards, and showed little reflection upon the phenomenon of simultaneous activities in general; they might rely upon the operator to take care of this. The informant from the PSA also said that most of the responsibility of the simultaneous activities lies upon the operator, because they determine the level of activities on each offshore installation

The overall impression when addressing H1 is that the understanding of the phenomenon *is* diverging between the stakeholders, also *within* their respective companies, and that their roles and positions thus might affect this. . Risk perception theory confirms that different interpretations are common, and both "common sense" reasoning, personal experience, social

communication, emotions and cultural traditions might affect this (Renn, 2008; Boyesen, 2003).

Could the regulatory control components be given responsibility for ensuring a more united understanding amongst stakeholders about this phenomenon, as stated in H2? Kaasen (1983, 1984) states that the *content of the regulations should be reasonably clear* and current actors should have *knowledge of the content*. None of these principles seems to be fulfilled when investigating this part of the legislation, and the understanding of it amongst current actors; Most of the informants did not know the regulations for simultaneous activities, and since their views on the phenomenon are diverging (as shown when addressing H1) it might be related to the content of the regulations.

When risk is perceived and valued differently amongst actors, this should be addressed in risk management (Aven and Renn, 2010; Boyesen, 2003). This underlines the importance of actors of the petroleum industry sharing the same platform when it comes to simultaneous activities. It should be mentioned that in the case of simultaneous activities, there are standards that apply to the handling of these through Work Permits. The industry has done some work to coordinate the use of Work Permits, and developed a standard for this[24]. However, none of the informants mentioned specific details from this standard, so the effect of such voluntary measures could be questioned.

The regulations on simultaneous activities do not say what it is, it only says that it should be defined, and comes with some examples of what it could be in the juridical- non-binding guidelines. The focus here is upon drilling and well activities (NORSOK D 010- Chapter 4.5). Several of the informants did for instance issue that it is hard to differ between activities and operations, smaller and bigger activities, and therefore hard to know what the regulations actually are addressing. One informant even went as far as saying that § 28 in the Activity Regulations was too diffuse for use in everyday work, and it should be questioned if it really was needed at all. To use legal terms, the regulations issuing simultaneous activities also consists of terms that might be seen as *legal standards*. For instance, in the Activity Regulations § 28, the terms *unacceptable increase in risk*, and *necessary measures* is used.

[24] See Samarbeid for Sikkerhet (Cooperation for Safety) standard AT 030N/2010 http://www.samarbeidforsikkerhet.no

The regulations on simultaneous activities do not seem to have promoted a united understanding about the phenomenon. On the other hand, this might not have been the purpose of the regulations either:

"The HSE regulations for the petroleum industry are based on functional requirements, with the guidelines giving more details on how regulatory requirements can be satisfied. But it is up to the companies to select technical solutions and to establish routines and systems tailored to the risk in each case" (Safety- Status and Signals 2009-2010: 25).

Accordingly, the standard setting makes it up to each actor to define, assess and address simultaneous activities in order to keep them safe. However, when considering other comments by the PSA there seems to be some sort of wish of a united understanding after all:

"The Norwegian petroleum industry has a long tradition that the oil companies contribute in developing best practice, and that the whole industry has confidence in and uses these solutions. Unfortunately, we have recently seen signs of a different culture emerging, with certain oil companies refusing to accept best practice and opting for their own solutions" (Safety – Status and Signals, 2009-2010:8).

When considering these two citations one might easily be confused. The chosen regulatory control components addressing simultaneous activities, with goal-oriented regulations, use of legal standards, voluntary industrial standard, and few and pre- informed audits might of some actors be seen as an opportunity to go their own way, and legally they are also allowed to.

The positive effects of the regulations in general were issued by most of the informants. These kinds of rules might easily be adjusted to any given situation, and to any sort of enterprise. They are said to better follow the technological and societal development, because they set no or few specific demands. Informants also mentioned that they were content with the PSA being more occupied with checking their systems, than if they had come in and stopped their work by referring to detailed regulations.

Other benefits are said to be that the actors are more committed to their own rules, in the sense that they are made by themselves, or say; specified by themselves. The benefit for the government might be that it is a more cost-effective regulatory solution (Baldwin, 1999).

However, it should be mentioned that these rules demands stronger efforts within other control components than standard setting in order to create coherence in interpretations.

A possible disadvantage is that legal standards may open up a multitude of possible interpretations if regulatory practice through court decisions, supervisory activities or sector involvement is at a minimum level ((Braut & Lindøe, 2010: 3)

In the general case of the Norwegian petroleum industry, it might be said that *sector involvement* is in place. The PSA has done much to involve the different actors in the sector, in order to hear their voices in the development of regulations and safe practices. This might imply that the criteria about good regulation addressing openness, and democracy are met (Baldwin, 1999). However, when considering comments given in this study, the effect of such measures might be questioned. The informant representing OLF, said this about involvement in the Regulatory Forum.

"It is not to be hidden that it is the operator`s side that is the dominating one. They are strong and stay strong, and there is no doubt that under the revisions the last years it has been operator first and then the others".

A comment in the RNNP report of 2010 addressing what measures that are suggested in investigational reports is also interesting in this case. The report summarizes the findings of 42 investigational reports, where of 6 were the PSA`s own and the remaining were the industry`s reports:

"Few measures are righted towards the industry and governmental level. This is something that might be connected with the investigators feeling incapable of affecting decisions that are made at higher levels that investigational or enterprise level" (RNNP, 2010: 110).

So even if the arenas for sector involvement are in place, the effect of such measures is not necessarily secured.

Supervisory activities are also at a relatively low level when it comes to simultaneous activities. In 2010 the PSA performed only one audit addressing simultaneous activities. Braut & Lindøe (2: 2010) also mentions that the use of common law demands, legal standards, like in this case, commonly is connected with intense dialogue between the actors. This is also usually accompanied with independent bodies as courts who are the ones that sort out the disputes (Braut & Lindøe, 2: 2010). Not many *court decisions* have been made in the petroleum industry. This implies that the regulations here is not accountable to and controlled by democratic institutions, as mentioned also by Baldwin & Cave as important criteria's of good regulation (Baldwin & Cave, 1999). OLF told about situations where specific operators easily might have argued and won disputes with the PSA in court, but that operators in most

cases chose not to go any further than to object in direct contact with individuals within the PSA. When he was asked about why it was so, he replied that the companies had much to lose, both reputation and a possible good relationship with the government. The latter might be good to have in the next turn, when new consents are needed, he said. This statement from an article addressing the management of the safety regulations in the petroleum industry confirms this:

"It is very rare that conflicts about the safety regulations end up in the courts. One important reason for that is probably the enterprises` wish to sustain a good reputation and to avoid negative coverage in the Medias" (Logstein, 2011:5).

All of these factors mean that regulatory practice is lacking, and this might add further confusion about the clarity and content of the regulations, also those that address simultaneous activities. The inconsistent descriptions used by the PSA itself when addressing the phenomenon of simultaneous activities might also explain the stakeholders` confusion[25].

As demonstrated in the beginning of this thesis, the offshore petroleum industry is complex. It might seem like the regulatory control components adds further complexity, in the sense of allowing and promoting different understandings amongst stakeholders.

The Deep Water Horizon accident did enlighten how complex organizational arrangements with many stakeholders can be fatal. Through the interviews in this study it was suggested that workers from as many as 10-15 different companies might be present at one single installation at the same time. The interest of each different actor and how well they are preserved might be subject to relations of power. Many comments given by the informants might be connected to this. To especially address simultaneous activities, a comment from informant S 2 should be mentioned. He says that simultaneous activities gets left behind in HAZOP[26]`s with operators:

"It is the operator that pays for these HAZOP`s. People are not always prepared for these meetings…Very often it turns out to be a technical and operational review, more than a risk review… And they are often more interested in their own things than in our small part of the whole operation…Connecting this to simultaneous activities; that is probably one of the things that is less addressed."

[25] See Chapter 9 References under PSA 2 and 3 (2011). The PSA uses the term *simultaneous operations* when adressing one of the audit reports, and *simultaneous activities* adressing the other.
[26] Hazard and Operability Study; qualitative risk assessment which collects experience and comments from different stakeholders in specific projects or planned operations.

This comment indicates that the operator determines the conditions for safety in simultaneous activities. This was supported by the informant from the PSA, I& E and also of OLF. OLF also mentioned the role of the steering committee. Findings suggesting that the operator has the most to say, and therefore have most power, are also found in comments from the PSA:

"The contractors said that they often struggle to influence the conditions that can affect the risk of serious incidents" (Safety- Status and Signals, 2010: 42)

If these comments are related to the use of power, it could be connected to *"power as a resource"* (Rosness, 2011). That is, because the operators have power already implemented in their being; rig-companies and sub-contractors rely upon their existence and acceptance. Informant R3 also mentioned that the strong position the operator Statoil has on the shelf right now, holding more than 70% of the market, not necessarily is a good thing for safety, because their interpretations of the regulations will be dominating, and these interpretations will not necessarily be the best for everyone.

One informant said that the labor unions don't like that the regulations refer to OLF standards: *"The labor unions don't like this because then it is visualized that the government is in the pocket of the industry".*

He says further that when OLF for instance wanted to have a standard on lifeboats, they sent it to DNV[27] for refinement so that the regulations might refer to a DNV standard instead.

These kinds of actions might be related to *Power in action*, as mentioned by Rosness (2011), because it might be seen as an action done to achieve a specific goal that conflicts with other actor's interests or preferences. In this case the other actors are the labor unions. It might seem in this specific case like OLF, who represents the employer's side in the three partite collaboration, is capable of getting what they want by taking another, and less visible way to the goal. A DNV standard might be viewed as more impartial than an OLF standard, and is therefore more likely to be accepted by the labor unions. It might be questioned how DNV willingly can transform a standard developed by the OLF into a standard of DNV. This might be related to *power in collaboration and network* (Rosness, 2011), the power is distributed in networks of actors. In this case it would be the DNV and OLF.

[27] Det Norske Veritas; A Norwegian independent standardization organization that works for the protection of life, values and environment (www.dnv.no).

The informants from the labor unions confirmed through the interviews that they were concerned about the industry owning the standards. They gave the impression that the industry might undermine safety through favoring income of the enterprises in these standards. The regulations refer to standards through the guidelines, and these might be said to make out the details of the regulations. One of the informants from the Sub-Contractor Company mentioned that she thought that the regulations demanded very much paper work. So even if the regulations are goal-oriented, the connected standards might be perceived as detailed regulations. This might imply that the industry is depending upon standards in order to detail out their management systems. This kind of practice has gained much attention in the field of regulatory theory. Since the regulations are mostly goal-oriented, and refers to details in the guidelines often given by standardization organizations of private art, it might seem like the standardization organizations have much to say, and thus have power in determining the actions of the petroleum industry. Hopkins (2011) discusses this, and questions the intentions and the ability of these organizations to discover and react to a certificate holder`s possible unsafe actions.

"The interviews uncovered concerns about the danger that a certificate holder undermines safety margins, (e.g. through cost cutting in maintenance), a process that often does not lead directly to dangerous situations, but on the longer term may well do so. A gradual reduction of safety margins may therefore seem financially attractive in the short term. It is questionable whether any of the CTRs is able to prevent such gradually diminishing safety margins. This would require that Certification & Testing Bodies have insight into, and understand fully the specific safety margins and the associated scenarios in their clients' organizations (this is usually not the case) and are willing and able to take appropriate action" (Hopkins, 2011).

The regulation of simultaneous activities in the offshore petroleum industry has been changing over the years; A move from no regulations in the beginning, to very strict control, and then a gradually shift over to become an area less addressed through regulatory efforts is evident. The informant from PSA stated that the regulations in general have changed during the years in order to fit market processes. He talks about internal control and how this is viewed as controversial by some because it might be viewed as privatization of governmental responsibility. Why did the regulatory shift in regulating simultaneous activities take place? And how may this implementation be linked to power? (See Empirical Findings, Regulation of Simultaneous Activities, PSA). None of the interviews gave any specific answers to those questions, but the informant representing SAFE had some reflections upon why the regulatory changes in general emerged:

"I think that it was the industry that forced this through. Maybe they even went as far as addressing Stoltenberg[28]. The industry really wanted this, and had wanted it for a long time. They said that the industry changed so fast, that goal- oriented demands was the only thing that could address it in a good manner".

In this case it might seem as some actors has promoted their interests through *power in collaborations and networks* (Rosness, 2011).

As noted, these examples of power cannot be linked directly to simultaneous activities. Still, it is interesting to discuss, since it might be speculated in whether the regulations for simultaneous activities might also have been formed in a way like this, due to the clear economical advantages of performing numerous simultaneous activities as mentioned by Spouge (1999) and also by the informants.

Informants representing the operator stated that the regulations could be interpreted by the PSA in a way that would make it impossible for the companies to ever meet the demands. (See Empirical Findings- Regulation of simultaneous activities). This impression given by the informants is further strengthened by the following comment by Logstein (2007):

"Within the safety regulation in the petroleum industry the actors alone are responsible determining whether the level of security is acceptable. The government will therefore not pre-approve any solutions through their statements, and the actors carry the risk themselves, regardless of the chosen solutions" (Logstein, 2007:3).

These two statements together might imply that the PSA has *power as a resource*; it is something they have in the sense of being the regulator, a part of the governmental side. It might also be argued that the PSA has power in *discourse and symbols;* (Rosness, 2011) what they say and how they interpret the regulations might be viewed as the use of power.

The use of power is inevitable in every society and industry. However, it might seem like the regulatory control components in some way promotes the use of power that has no legal basis, since the chosen regulatory control components, and then most importantly the standard setting, gives room for different interpretations.

[28] Jens Stoltenberg is the prime minister of Norway since 2005. He also served as the Prime Minister in the years 2000-2001.

O`Malley (2004) states that the use of common law principles and deregulation is part of what he calls neo-liberalism. The responsibility for risks is moved downwards, from governments to individuals and entrepreneurs. This move, he argues, is pushed by governments in order to create innovation and competition in industrial markets. It is interesting to note that the use of common law principles in regulations is not a part of Norway`s traditional legal system, and it might therefore be questioned to what extent the shift in regulatory style in Norway really is done to promote safety. On the other hand, there exists no evidence that the extensive use of legal standards has weakened the safety situation or increased the risk of accidents, there seems to be more proof that points the other way (Braut & Lindøe, 2010:2). The increased level of safety since the introduction of oil industry in Norway, along with a gradually shift from a command and control regulatory regime, towards a regime of enforced self regulation, might serve as an indication of this. However, Ryggvik (2008) sees this positive safety trend rather as an effect of the very strict rules regarding technology and design that were imposed to the industry from 1976 and forward (Ryggvik, 2008).

I might also be argued that experience has much to say in the development of safe practices. Even if such experience now exists amongst the Norwegian actors of the shelf, it might be questioned whether the newcomers in the industry will be able to take part in this shared knowledge. Consequently, they might also not be familiar with the deep foundations of trust between the government and the actors of the industry that lies implicit in the goal-oriented regulations (Braut & Lindøe, 2010:2). Hopkins (2011) argues for a shift from a focus upon on goal-orientation (in the sense of risk-management approach in regulation[29]) in rules, and over to rule-compliance.

For those who see history as progress, the implication is that the risk-management approach is to be preferred, and any attempt to move the balance in the other direction is somehow retrograde. But for those who see change more as a swinging pendulum, it is conceivable that the pendulum has gone too far in the direction of risk-management and that the time has come for a swing back in the direction of rule-compliance (Hopkins, 2011:4)

The two areas, risk-management and rule-compliance are not contradictory; the one does not necessarily exclude the other (Hopkins, 2011). Taking this point of view might say that a shift

[29] The risk-management approach is described as the "new" way to regulate. This trend started after the Lord Robens report in the 70 ties which argued for a shift from rule-compliance over to making the actors more accountable by proposing goal-oriented demands for safety, for instance principles like "as-low-as-reasonable-practicable" (ALARP)(Hopkins, 2011).

in the chosen regulatory control components for simultaneous activities in the Norwegian petroleum industry not necessarily means to take away beneficial parts of this strategy; for instance the three-partite collaboration and the other arenas for cooperation.

It might be argued that the regulatory control components addressing simultaneous activities are especially adjusted to fit the complexity of the offshore petroleum industry, in the sense that the regulations might be applied and used by every stakeholder to fit particular conditions in each and every company. However, each of the companies does not operate single-handedly; they are gathered on installations in simultaneous activities. If the purpose with regulatory control components is to create some sort of united understanding and risk evaluations (as addressed discussing H1 and H2) , then H 3 seems to be confirmed; the regulatory control components addressing simultaneous activities have not been updated to comply with the new complexity of the offshore petroleum industry and might lead to increased risk.

The 7 Th of May in 2010 the PSA established a project on the basis of the disaster on the Deepwater Horizon Gulf of Mexico. The overall objective of this work was to systematize and evaluate the experiences and investigations after this accident in order to contribute to learning and improvements on the NCS (PSA 5, 2011) in the latest conference held in this connection, the PSA gave the following statements:

"It may be relevant to consider to what extent the conditions for a functional regulatory framework is in place in the Norwegian petroleum industry… It may be necessary to clarify some sections of the regulations..." (PSA 6, 2011)

The sections they referred as relevant to clarify were related amongst others to the responsibilities and roles of the different stakeholders, and also a clarification on issues that are connected to risk of major accidents contra individual risks. Both of these issues might be found in simultaneous activities. Simultaneous activities might increase the likelihood of blowouts (Spouge, 1999) which is seen as a risk indicator for major accidents (RNNP, 2010). Lines of responsibility are also of especial importance in simultaneous activities (Spouge, 1999).

These recent statements from the PSA indicate that even if the regulatory control components not seem adjusted to a changing industry, changes might be on its way.

7. CONCLUSION & SUGGESTIONS

Based on the findings of this study, the impression is that the regulatory control components addressing simultaneous activities in the offshore petroleum industry do not promote safety. Assumptions' emerging through the initial desk-top study thus seem reliable. The overall reason is that the regulatory control components seemingly have failed in generating a common understanding of responsibility, hazards of and definitions of the phenomenon in question. This will again open up for the use of power with no legal basis.

Still, the regulatory control components give clear benefits to some of the stakeholders of the industry. There are no limits to how many simultaneous activities one can conduct at once, and also no limitations related to how many stakeholders that can be represented at one installation. This fact will surely promote efficiency and generate income in a way that promotes further development and innovation. However, the story might be another for other stakeholders. Individuals might be subjected to a risk that they cannot, or only to a small extent affect. The same might be the case for sub-contractors.

Simultaneous activities have during the years changed its appearance in general. The occurrence is increasing due to major changes in the industry, and more stakeholders are involved due to market processes. In addition, the technology is increasingly complex, and stages of organizational planning that earlier were separated in time are now overlapping. Organizational factors are seen a major cause of accidents and when investigating the phenomenon of simultaneous activities, it becomes clear that this factor might become even more important in the following years.

Considering these changes together with the mandate of the PSA, which is to ensure that health, safety and environmental issues is handled in a proper manner, the regulatory control components regarding simultaneous activities should be revised. Recommendations towards the regulatory control components could e.g. include the following changes (Table 4):

Standard setting	Ensure consistency in terms when addressing the phenomenon of simultaneous activities. The terms to be used should be set in cooperation with the industry.	Move towards more specified regulations regarding simultaneous activities for instance by addressing the differences between simultaneous activities and operations.	Make the content of the guideline related to § 28 in the Activity Regulations legally binding by placing it in the regulation itself	Set specific demands for handling Work Permits; for instance a legally binding standard to ensure that all stakeholders on the shelf use the same standard
Information gathering	Ensure consistency in terms when addressing simultaneous activities. When addressing the phenomenon in the RNNP report questionnaire, terms known to the informants should be used.	Increase audit activity towards simultaneous activities.		
Behaviour modification	Increase focus upon the possible safety related implications of simultaneous activities (technologically, operationally and organizationally), in investigations of accidents.			

Table 4- Suggestions related to regulatory control components

8. SUGGESTIONS FOR FURTHER RESEARCH

Detailed dive into regulations for the Offshore Petroleum Industry

It came as a surprise that the regulations and belonging standards of simultaneous activities were so sparingly reflected and known amongst the actors in general. This study is relatively small, and as in all social science, confounding factors might have affected the results. Still, it would have been interesting to see whether the same results would have emerged in another study of simultaneous activities or other specific regulations. And could the results have said something about the usefulness of the chosen regulatory control components in promoting safety? How could the regulations effect on safety be measured?

Another interesting approach would be to compare two regulated areas of the petroleum industry, since not all regulations for the offshore petroleum industry in Norway are considered goal-oriented. One example is for instance diving[30], which is regulated with great accuracy compared to other areas. Why are the regulations differing, and what effects might it have in risk evaluations when some activities are more strictly regulated than others? Could this provide an implicit message to the actors about which areas that are most relevant to address?

The Offshore Petroleum Industry and High Reliability Organizations

Some will also state that complex organizations can be handled through efficient management systems. Weick & Suthcliffe (2001) and other proponents of a theory called High Responsibility Organizations, have through studies of large high-risk industries showed that complexity might be handled in a safe manner. The studies carried out to form the theory of HRO`s is based on empiric material gathered from military organizations or organizations that are strongly influenced of such cultures (aviation, nuclear power) However, the discipline associated with such cultures might be unacceptable in Scandinavian work environments (Rosness, 2004). The question is also to what degree such HRO`s might be formed in an industry like the offshore petroleum industry, where the organizations in reality consists of numerous smaller organizations through outsourcing. (Rosness et.al. 2000). Workers in all of these parts of the organization will have their own interests, their own culture and in more and more cases also their own language in addition to their own management systems in their

[30] See The Petroleum Activities Regulations section 93 and 94 at http://www.ptil.no/activities/category399.html?lang=en_US

baggage when they come to an offshore facility. Some might only be there for days, and never come back. An interesting question will thus be; how can the offshore petroleum industry and its organizations come closer to the normative theory of High Reliability Organizations?

Complexity- a risk indicator?

Complexity as it exists in the petroleum industry might be dealt in several ways. For instance, BP has after the Deep Water Horizon accident said that they may have went too far when it comes to outsourcing, and is thus considering reducing the number of sub-contractors[31]. Is this an attempt to reduce complexity? Could complexity have been a risk indicator so that instead of constantly trying to deal with complexity, it should rather be reduced? This would cost, but considering the devastating consequences on both safety, environment and health, in the long run it might pay off after all (See Charles Perrow,2007) *The Next Catastrophe-Reducing Our Vulnerabilities to Natural, Industrial, and Terrorist Disasters*). In what way could complexity have been a risk indicator, and how could complexity have been reduced in the offshore petroleum industry?

Simultaneous activities

The impression is that little literature exists on this area. It might be so that such literature is implemented in each company`s internal base of knowledge, and thus not available to outsiders (like students and scientists). More studies could have collected this knowledge, and thus provided valuable contributions to addressing safety in simultaneous activities.

[31] Stavanger Aftenblad, Wednesday 16th of February, 2011.

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Information and interview guide

The questions in the interview guide is related to a Master`s thesis in Societal Safety at the University of Stavanger. It will be included in the project "*Robust regulation in the petroleum industry*", which is a collaboration between the main partners University of Stavanger, The Petroleum Safety Authority (PSA), the employer association Oljeindustriens Landsforening (OLF), the labour unions Industri og Energi (I&E) and SAFE.

In a world where demands for efficiency in work processes and new technology are increasing, concurrent activities and regulation of these are increasingly more relevant. The number of companies operating on the Norwegian shelf is growing, and companies with different backgrounds and nationalities are more than ever working together. Norwegian petroleum regulation is goal-oriented and stakeholders at all levels (operator, rig- and sub-contractors) are obliged to establish their own management and internal control systems for all their activities. Each company has its peculiarities and this increases the complexity of not only purely technological matters but also organizational and operational ones. Simultaneous activities and the coordination of these will depend on the quality of the different stakeholder`s ability and willingness, and the given regulation plays an important role in how this work is performed across enterprises. The purpose of this study is:

1. Illustrate the phenomenon of simultaneous activities seen from all levels of the petroleum industry and from government level.

2. Look at how this type of activity is regulated by laws, regulations and audit activity.

3. Examine what impact the understanding of the phenomena and laws may have on the safety of simultaneous activities at the enterprise level.

The questions in the interview guide are meant to be guiding for conversations with informants within the petroleum industry. The questions are directed basically against simultaneous activities on fixed and floating offshore installations.
The interviews will be carried out with a tape recorder. This is to ensure that the records will be as accurate as possible. It is up to the individual informant if this is okay. The informants' names and positions may be anonymous if desired. Information given through the interviews

may if desired, be sent to each informant for approval. Informants also have the right of access all information that he / she have given, and are free to withdraw this at any time in the process. All information collected will be treated strictly confidential according to standard procedures at the University of Stavanger. The thesis will be submitted 15 June 2011. After this, all audio and text files that are not part of the written thesis from will be deleted.

Thank you for your participation!

Sincerely,
Karen Maria Thaule-Pedersen

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The phenomenon of simultaneous activities

1. How do you understand the phenomenon of simultaneous activities?
2. To what extent and how does the phenomenon of simultaneous activities create complexity on an organizational level?
3. To what extent and how does the phenomenon of simultaneous activities create complexity at an operational level?
4. To what extent and how does the phenomenon of simultaneous activities create complexity in a technological sense?
5. To what extent is the phenomenon of simultaneous activities a theme in your business?
6. In what way are simultaneous activities a theme in your business?

Regulation of simultaneous activities

1. What are the positive aspects of the official regulation of simultaneous activities?
2. What are the negative aspects of the official regulation of simultaneous activities?
3. How are norms of simultaneous activities within your company?
4. What are the major challenges when it comes to regulation of simultaneous activities?
5. Do you think that problems may occur when the standard-setting around simultaneous

activities gives room for interpretation so that interpretations can vary from company to company?
6. Do you see other possible solutions?
7. If yes, would more detailed regulations have been the solution?
8. How do you think that the responsibilities of simultaneous activities are defined by the authorities?

Safety in simultaneous activities

1. Describe the hazards of simultaneous activities
2. What organizational challenges do you see in terms of safety when it comes to simultaneous activities?
3. What operational challenges do you see in terms of safety when it comes to simultaneous activities?
4. What technological challenges do you see in terms of safety when it comes to simultaneous activities?
5. What impact has regulation for safety in simultaneous activities?
6. Do you think that any changes in today's regulation given by the PSA towards simultaneous activities lead to increased safety?
7. Alternatively, the changes in legislation may lead to increased safety in concurrent activities?
8. What can companies do to ensure safety in simultaneous activities?
9. How important is it that there exists a common understanding of concurrent simultaneous activities between enterprises in terms of safety?
10. Have you ever experienced situations where there is/ is not a common understanding of the phenomenon in simultaneous activities.
11. Are there more questions you think should be asked in this interview? More you want to add?