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The Relationship between Safety Culture and Adoption of Innovation

Empirical evidences from a healthcare organisation and an offshore organisation in Norway

MSc in Innovation and Entrepreneurship

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Abstract

This study investigates the relationship between safety culture and adoption of innovation, and is intended to characterise the way they interact in an organisational environment. The empirical evidences for this research are accumulated from a healthcare organisation and an offshore organisation in Norway. The research propositions for this study are built upon a broad literature review of two independent topics, namely safety culture and adoption of innovation. Two propositions aim to identify the level of safety and the safety culture within the two organisations analysed. Additionally, three propositions aim to recognise important factors of a successful organisational innovation adoption. The research is based on qualitative analysis of primary data acquired through interviews with organisational members within the two units of analysis. The two organisations analysed are considered to be high-risk organisations with a continuous requirement for improvement through innovation.

The research expresses the analytical methods and anchors the findings by establishing a triangulation through theoretical frameworks, data collection methods and data collection units. The coexisting perspectives, methods and data collection units evolve independently throughout the research and in the end converge to acknowledge potential relations between safety culture and innovation adoption.

The empirical evidences consistently indicate that there are synergies between safety culture and the processes of adopting innovation; the capabilities essential for the advancement of safety culture are equally required for the practice of organisational innovation adoption. Consequently a relationship between the two phenomena is proposed. This put forward a request for further research on the association between safety culture and innovation adoption.

"Open your arms to change, but don't let go of your values."

- Dali Lama

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1. Introduction

1.1. Background

Innovation became the industrial religion of the late 20th century, and this trend does only seem to become more popular. In virtually all industries companies talk about the importance of "doing" innovation, the majority actually also try to "do it", however, not everyone truly succeed. Because of this innovation tends to frighten organisations; innovating is inevitably linked to risk. To become a company that succeeds in doing innovative changes more is required than to have the tangible resources needed and just to "do it". This is not enough, and research has argued that innovation needs to be complemented by clear leadership and an organisational culture that constantly guides its members to strive for improvement through innovation (Nahavandi 1993, Ahmed 1998, Kotter 1998). Climates with initiative and psychological safety have also been recognised as essential to bring the full potential of innovation related change to a company (Baer and Frese 2003). This identifies complex associations between innovativeness, organisational culture and climates, firm performance and successful innovation. Organisational culture has become by the theorists the acknowledged mediator of the bond between transformational leadership and organisational innovation (Deshpandé, Farley et al. 1993, Amabile 1998, Jassawalla and Sashittal 2002). However, to the researcher's knowledge organisational ability to adapt to change through innovation has never been discussed in the light of the culture for safety. A safety culture is a subculture of the overall organisational culture. It includes many of the factors of an organisational culture that have been recognised to affect acceptance and ability to adopt to change through innovation. One example is the climate for psychological safety. This refers to formal and informal practises and procedures, motivating and supporting a work environment that is open and trustful, allowing employees to safely speak up without being rejected or punished (Edmondson 1999). This is one of the factors that are considered essential in an ideal safety culture, which also has been identified to positively affect how organisations adopt innovation. Therefore this research was dedicated to identify relations between safety culture and organisational innovation, and to discuss whether an advanced safety culture might positively influence an organisation's innovation adoption process.

1.2.　　Importance of the Research

We live in a world full of industrial challenges, with an increasing market pressure, high competition, lack of resources and new risk realities confronting most industries. The possible best and most obvious way to deal with these challenges is to make use of innovative solutions in form of improved processes, new technological systems and cost-reducing implements. One societal aspect of innovation in regard to improve industry is the potential of improving industry safety; reducing risk of environmental damage and human harm. High risk industries, such as the oil and gas industry and aviation industry, have always been concerned with safety. Academics claim that during the last decade the oil and gas industry has moved from a culture where accidents were regarded as unavoidable, to one where deaths and injuries are principally non-existent and personnel are safer once they enter their workplace than in their own home (Hudson 2003). This has followed as a result of many improvements in safety procedures and systems through making use of innovation, as well as a clear focus on improving the cultural attitudes towards risk and safety.

However, the healthcare sector, that also can be defined as a high-risk industry in regards to human safety of its patients, has apparently not been able to utilise innovations as effectively to increase their levels of safety. The practice of medicine in Western countries still appears to be overly risky for patients, and the sector is generally considered to lag behind other industries regarding innovation. The report "To Err Is Human: Building a Safer Health System", the Institute of Medicine (IOM) estimates that 98,000 hospitalised Americans die every year as a result of human errors (Kohn 1999). This is higher than the numbers of fatalities caused by motor vehicle accidents, breast cancer and AIDS combined in the USA (Page 2004). Now, more than ever, the Western societies demand safe healthcare. There is an increased pressure on the sector to deliver quality, despite the lack of resources and the amplified needs of an ageing population facing chronic diseases. To respond to this apparently prohibitive situation the demand for innovation and sharing best practice of how to best utilise the complex new technological advances has never been greater. Other highly hazardous industries with advanced safety cultures, such as the oil and gas industry, have found ways of operating through utilising innovation that can serve as lessons for the healthcare sector and other industries requiring change.

1.3.   Research Problem and Strategy

The utmost objective of this study was to investigate the relations between safety culture and innovation adoption processes within organisations. The motivation behind this inquiry aroused from the high focus on innovation in healthcare; the creation of a "*high-tech*" healthcare sector, and from the current discussions in the media criticising the quality of care within Norwegian hospitals. These topics were deliberated and reflected upon with the researcher's contacts from the Healthcare Department in Det Norske Veritas (DNV). Based on these thoughts the researcher came up with the idea of investigating the relations between safety culture and innovation adoption. Two industries were chosen to be studied, one industry that has demonstrated to be very successful in utilising innovation to increase its safety levels and one industry that still has much potential for improvements, accordingly; the Norwegian offshore industry and the Norwegian healthcare sector. The research concept is illustrated in Figure 1. Through identifying factors affecting attitudes towards change and the modes of adopting innovative processes the objective was to define best practises that might offer useful implications for the industries studied as well as for other industries.
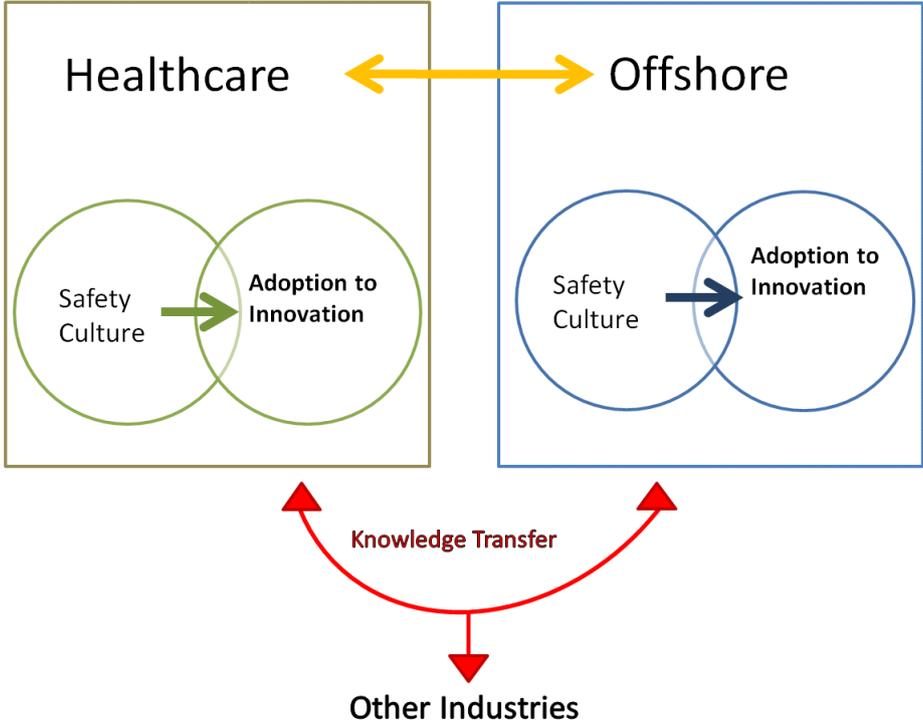
Figure 1. Research Concept

By investigating differences in the psychological and practical implications of innovation implementation and risk management between the two sectors, the aim was to explore whether there were possibilities for knowledge transferring between industries of how to best utilise innovation to manage risk and increase safety levels.

To investigate the above-mentioned problems, the following research question was formulated for this research:

- How does the cultural attitude towards risk and safety in the Norwegian offshore industry and healthcare sector affect their innovation adoption processes?

When exploring this question it was of interest to look at the differences in the safety culture between the two sectors studied. In order to recognise differences in culture it was of relevance to understand the formal risk and safety control processes, and identify the managements' managerial role in the safety process. Identified differences in the safety management process were linked to differences in the safety culture within the two sectors. The research examined how management and employees' attitudes in regard to risk and safety differed between the two sectors. This was compared and linked to how managers and personnel in the offshore and healthcare industries felt about innovative processes and new technology. Ultimately this suggested whether the maturity level of the safety culture did affect the way the organisations adapted new technology and processes.

2. Literature Review

In this chapter some central definitions of safety culture and innovation adoption was clarified to compile a review of important literature that has been written on these two topics. Safety culture and the innovation adoption process were presented as two parts in this literature review: one "Safety and Safety Culture" section and one "Innovation Adoption" section. The safety and safety culture section was aimed to examine what a safety culture is, and how it was defined in this research study. This section also introduced the manageable factors that were regarded to affect a safety culture, and presented the theories chosen to measure cultural levels within the organisations. The Innovation Adoption section briefly defined types of innovation, and described how to measure innovation adoption processes within an organisation.

Within the knowledge of the researcher there were no previous academic literature discussing the effect of a safety culture on the organisational ability to adopt innovation. Based on this it was assumed that the reader would not be familiar with both of these phenomena. Therefore the researcher made a deliberate choice of writing an extensive and descriptive literature review. The literature written about the research areas separately; safety culture and innovation adoption, were broad. Consequently not all sources were covered herein, though a carefully selected collection of important work were discussed, chosen based on its relevance in enlighten the purpose of this research.

2.1.   Safety and Safety Culture

Researchers have known for many years that safety performance is affected by an organisation's socially transmitted beliefs and attitudes toward safety; the organisations safety culture. The safety culture of an organisation is very complex and hard to study, nevertheless it is possible to examine factors that make up the culture. This sections objective was to inform the reader of this research study's focus when characterising and measuring safety culture and safety within its units of analysis. The section was separated into five parts; Safety Culture, How to Create an Ideal Safety Culture, Human Factors of Safety, Cultural maturity Model, and Safety within the Offshore Industry and Healthcare Sector.

2.1.1.   Safety Culture

The widely known perception of safety culture first emerged after the Chernobyl accident which was a catastrophic nuclear accident in the Ukraine in 1986 (Meshkati 2007). Weaknesses in organisational safety caused by human errors in this accident highlighted the potential safety risks associated with how the culture for safety is within an organisation.

In the International Nuclear Safety Group (INSAG)'s post-accident report (1988) "Summary Report on the Post-Accident Review Meeting on the Chernobyl Accident" safety culture was described as: "that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance" (International Safety Advisory Group 1991). A statement created to underline that safety culture is both attitudinal and structural, and that it relates both to organisations as a whole and to single individuals or groups working within a organisation.

The concept was introduced to explain how the lack of knowledge and understanding of risk and safety by the employees and organisation contributed to the disaster. Safety culture is found to be one of the major prognosticators of the safety performance of an organisation (HealthandSafetyCommission 1993). During the years many different definitions of safety culture have evolved, and there is no universally accepted definition measure of a safety culture. One often cited author in the safety culture literature is T.R. Lee. In 1993 he published the definition that a safety culture is all forms of learned behaviour which "add up to a shared commitment to think safely, to behave safely and to believe and trust in the safety measures put in place by the organisation" (Lee 1993). However, in a later paper in collaboration with Booth they contracted the definition to; learned behaviours to organisational attitudes, risk perceptions and beliefs in the necessity, practicality and effectiveness of controls (Booth 1995). Though definitions do vary, most literature reviews agree that the term refers to a set of safety related values, attitudes and assumptions that are shared between the members of an organisation (Guldenmund 2000). In an organisation there are various factors that shape how people behave and work together. Values, attitudes, beliefs, norms, embedded processes and unspoken assumptions are all factors important to form an organisational culture. When a culture has evolved it becomes a central part of how an

organisation works, which is stable and difficult to change even when individual employees move on or teams change (Woodward 2004).

An ideal safety culture could be described as a culture where staffs and managers have a constant and active awareness of the potential for things to go wrong. For this to be possible the culture also needs to be open and fair, and encourage people to speak up about mistakes and potential safety issues. In organisations with a safety culture like this people are able to learn about what is going wrong and what could go wrong, and by this take action on the potential safety issues to minimise future risk (Donaldson 2002).

Safety culture is often confused and been used interchangeably with another concept: "safety climate". Safety climate is considered to be a part of the overall safety culture in an organisation, though it more refers to the employees shared views of the value and the importance of the organisation's safety policies, procedures and practices (Anderson 2012) . Mearns (1999) describe the two as; climate reflecting attitudes, perceptions and beliefs while culture as something more complex, reflecting values and norms and being evident in safety management practices. This may suggest that it might be easier to measure a climate in comparison to a culture. As Anderson (2012) describes it; a safety climate can be seen as the more temporal "state of safety" at a discrete point in time, and is the more measurable aspect of safety. However, there are overlapping definitions of the two concepts, and it is clear that researchers within the field of safety culture have not agreed on the universal differentiation of the two terms. By comparing nine different definitions of safety climate, and seven definitions of safety culture from 1980-1997 collected in the article "The Nature of safety culture: a review of theory and research by Guldenmund (2000), the word most often used to describe climate is "perceptions" (in seven of nine definitions), though also "beliefs" is commonly used, and "attitudes" is mentioned in one of the definitions. Safety culture, however, is described by more varying terms, including all of the above mentioned words, though also terms such as "values", "characteristics", "competencies", "commitment" and "behaviour". Because of this unclear differentiation of the two concepts one will have to take into consideration when reading this research study that when safety culture is mentioned hereafter it will be overlapping with the concept of safety climate. So safety culture will be viewed as involving perceptions and attitudes as well as the behaviour of individuals within an organisation.

2.1.2.   How to Create an Ideal Safety Culture

The National Patient Safety Agency (NPSA) wrote in 2004 a seven steps guide for National Health Service (NHS) organisations in the UK to improve their patient safety (Woodward 2004). The first step they claimed would improve safety was "Build a safety culture." To have a functioning safety culture is essential to accomplish high levels of safety within all industries. That employees and management are aware of potential risks, and that there is high focus on preventing faults and accidents from happening, are key factors for a good safety culture. However, building an ideal safety culture is not an easy task and there is much literature discussing how this could be done.

Harvey (2002) claims that in order to create a good safety behaviour within an organisation the salience of safety must be taken into consideration, since this determines the importance of certain behaviours. Additionally he states that the trust in safety policies and managerial action is also essential. The International Safety Advisory Group (1991) defined two key measures of safety culture: (1) the framework determined by organisational policy and by managerial action; and (2) the response of individuals in working within and benefiting by the framework. They suggested that "success depends on commitment and competence, provided in the policy and managerial context and by individuals themselves", meaning that attention to safety involves individual awareness of the importance of safety, knowledge and competence through training and instruction, as well as commitment, motivation, supervision, and responsibility.

There is no general agreement about what factors create an ideal safety culture, however, the attempts to define the factors that create an ideal safety culture suggest that high levels of organisational safety depends upon organisational culture in general as much as it does upon specific consideration to health and safety matters themselves (International Safety Advisory Group 1991, Cox 1998, Mearns 1998). Therefore factors such as trust, communication, leadership involvement and satisfaction with the work environment play important roles in creating an ideal safety culture.

As Woodward et al. (2004) write in the "Seven steps to patient safety" report, one should aim to create a culture that is open and fair. By this they mean a culture where communication and sharing of information comes naturally, and when incidents do happen there is a fair treatment of the individuals involved. The problem often seen in different industries is the opposite,

when incidents or near-misses happen the management is out to point fingers and blame the individuals responsible of the error. Such a destructive "blame culture" is strongly working against the safety within the organisation. To keep an open and free communication about safety considerations will be very difficult with a blame culture as employees will not be comfortable admitting their mistakes, and the organisational awareness of potential risks decrease. The organisations ability to acknowledge mistakes, learn from them and take action to prevent the same mistakes from happening again is therefore diminishing. This is why it is so essential to acknowledge that human errors do happen. If the organisation can learn from its mistakes the long term safety benefit of the organisation as a whole will be much greater than to depreciate the guilt on single individuals.

To create an open and trusting environment leaders of an organisation need to express interest and involvement in the work environment and safety of their employees. As Woodward et al. (2004) write in the "Seven steps to patient safety" report, leaders need to front as a good example by establishing a clear and strong focus on safety. The rapport further says that organisations will need good systems and processes for managing risk and identify potential risks. These should be adapted to fit the personnel's work environment, and a good communication and feedback around potential enhancements to the systems will be beneficial. Reporting incidents and safety issues should be promoted, and the reporting tools should be easily available and user friendly. The organisation should learn to share "safety lessons", to allow continues improvement on safety and the safety culture, by encouraging staffs to use root cause analysis in order to learn how and why incidents happen, and embed lessons through changes to practice, processes or systems. Therefore a lot of the responsibility to advance a safety culture is laid upon leaders. Managing an organisation's safety requires a long-term approach focused on key determinants of the safety culture. Management needs to commit to safety at all levels, from the first-line supervisors to the managing directors and top management. Leaders need to demonstrate commitment by prioritising safety. This might be especially important when an organisation is pressured by conflicting safety and production objectives.

When investigate the relations between safety culture and the innovation adoption process it was essential to get a clear impression of the levels of safety culture within the two organisations in question. Based on the theoretical analysis it was therefore of interest for the purpose of this research to look at the framework determined by organisational policy; how the risk and safety control processes and protocols were designed within the organisations,

and to understand the managements' managerial role and involvement. It was also of significance to assess how competence and knowledge around risk and safety were conveyed through training, and to consider the awareness of the importance of safety within the organisations. To examine how open and trusting the organisational cultures were was of relevance to identify the affect of safety culture on innovation adoption processes. This was done through looking at how the attitudes towards reporting and blame were among the personnel and leaders, and how the organisations learned and took action based on their internal experiences and ability to predict potential future issues. The impressions of the safety cultures were then compared and linked to how managers and employees within the organisations felt about innovative processes and new technology.

2.1.3.　　Human Factors of Safety

Despite preventative mechanisms and strict protocols accidents do still tragically occur. It is found that greatest threat to complex and potentially hazardous systems are human rather than technical failures. By studying a number of high-hazard and high reliability industries it has been indicated that human factors attributed to around 80% of all accidents (Hoyos 1995). This is why, when discussing safety and safety culture, it is so important to underline the factor of human error. To err is human, but for many individuals, such as those who work with offshore operations or provide medical care, the consequences of a minor error can result in catastrophic and life taking events. Human factors can be moderated; though they can never be eliminated and managing the human risks cannot become 100% effective.

Many people regard safety incidents as random occurrences or unpredictable events beyond effective control. But although chance does play a part, and human error will never be eliminated entirely, the majority of incidents fall into systematic and recurrent patterns. Different errors occur in different parts of an organisation, and have different underlying mechanisms. Human errors can be categorised in different ways based on their basic components; causal factors, timing, consequences and mitigating factors (Reason and Hobbs 2003). Reason (1995) defines some commonly accepted distinctions between some groups of causal factors;

- *Execution failures* (slips, trips, delays etc.) versus *Planning/problem solving failures* (rule based mistakes or knowledge based mistakes).
- *Errors* (information-handling problems) versus *Violations* (motivational problems).

- *Active failures* (committed by those in direct contact with the product) *versus Latent failures* (arise in organisational and managerial domains and adverse effects may take a long time to become evident).

Human errors committed at any level in an organisation can ultimately have significant effect on safety. Wrong decisions made by organisation management can create the conditions that can lead to human errors and violations further down in the lines. Such latent failures are therefore not easily identified before an accident eventually happens at another place within the organisation. Therefore human errors are subject of complexness and are products of a chain of causes from top to bottom within an organisation. Inevitably the individual psychological factors are the last and least manageable links of this chain. For example it is almost impossible to predict and control whether someone gets distracted or forgets to follow a safety protocol; a common factor of executional failures. Nonetheless, the surrounding factors leading to forgetting can be modified by increase focus on that protocol, decrease pressure in work environment, encourage double-checking etc. Effective human factor management therefore requires an understanding of the varieties of human error and the conditions likely to promote them so changes can be made that maximise performance rather than set people up to fail.

As already mentioned all safety incidents have four basic components; causal factors, timing, consequences and mitigating factors. Each of these components should be considered in the systems approach to reduce human errors:

1. *Causal factors*: these factors play a major part in any human error caused safety incident. Removing them can prevent or reduce the chance of a similar events happening again. Reason and Hobbs (2003) groups causal factors as follows:
   - *Latent system conditions:* These are the underlying rather than immediate factors that can lead to safety incidents. As described they arise in organisational and managerial domains and adverse effects may take a long time to become evident. They relate to aspects of the system in which people work. They normally have a good intent though create potential problems within the system. Examples of latent system factors include decisions on; planning capacity, designing a new work site, policy-making, communicating systems etc.
   - *Active failures*: Errors caused by 'unsafe acts'. They are actions by frontline workers, and include execution failures, mistakes or violations of a process, guideline or policy.

Usually unpredictable errors showing instant adverse events. Often they can be influenced by latent system conditions and contributory factors such as stress, inadequate training and assessment, poor supervision or high workload.

- *Violations*: When individuals deliberately or unintentionally do not follow a procedure: they may not be aware of the procedure; the situation dictates a deviation; it has become habit; the procedure has been found not to work; the procedure has been surpassed by a new one but it has yet to be rewritten.

- *Contributory factors*: These are factors that can contribute to an incident, such as; language difficulties; physical limits, e.g. difficulty of hearing or seeing something; psychological factors; work relationships; misunderstandings, e.g. of guidelines, miscommunication; management style; lack of respect for less senior; quality of training; equipment factors; resource factors; working conditions; environmental factors, etc.

2. ***Timing:*** A bad timing allowed for the causal factors to take place simultaneously with failures in the defences or controls system leading to an incident that would not have had the same consequence if it had happened before or after (Reason and Hobbs 2003).

3. ***Consequences:*** The impact incidents have on its surroundings, ranging from no harm to various levels of severity: low, moderate, severe human harm or environmental damage (Reason and Hobbs 2003).

4. ***Mitigating factors:*** Some factors may have mitigated or minimised a more serious outcome, such as chance or luck, and actions or inaction (Reason and Hobbs 2003).

There may be more than one causal factor involved in any human error, and potential for incidents to happen is often connected with latent conditions combined with local conditions (active failures and contributory factors). Lawton (1998) also showed that accidents happen when unintentional errors combine with intentional acts such as rule breaking. Clearly human factors do not act in isolation. Human behaviour, error and violation are shaped by circumstances. "The likelihood of an unsafe act being committed is heavily influenced by the nature of the task and by the local workplace conditions" (Reason 1995). Risk is an unavoidable element and any situation or object can cause a dangerous situation in the hands of a person at the wrong time, the wrong place or with the wrong disposition towards risk.

Though several underlying causes in form of latent failures within the organisations structure have to be accounted for, research focusing on human errors in the oil and gas industry has indicated that the lack of care and attention is reported as one of the main factors for human

factors caused incidents (Rundmo 1995, Rundmo, Hestad et al. 1998, Mearns, Flin et al. 2001). Therefore an important aspect of human factors is also the fact that every individual is different in its behaviour and attitudes. Every individual has a certain alignment towards risk and individual differences in the willingness of taking risk; personality and the tolerance of uncertainty, innovation and willingness to think outside the box, will influence the way people consider risk (McCrae 1997). A human's focus on potential benefits compared to focusing on what might go wrong is dependent on personality and will ultimately decide how much risk individuals are willing to take (Eysenck 1992). This will be evident in the way we drive our cars, in our diets, in our relationships, in our careers and also in the way we behave at our workplace. However, risk taking is indispensable for any scientific, business or even personal progress and success. Individual psychological factors to human error causes therefore subjective risk assessments or risk perceptions. People evaluate the characteristics of hazards or various features of a situation differently which lead to different feelings towards levels of danger or safety. In addition human factors may be affected by social, cultural and political processes as they also play an important role in the founding of tolerance of risk and attitudes to safety (Mearns 1995).

Human factors are clearly a complex and difficult factor to prevent when managing risk in high-risk industries, though very important to take in to consideration. General risk management literature has little focus on the human effect on risk and safety. Academics and professionals have expressed concerns about the low of focus on the human factor the risk management debate (Adams 1995, Hillson 2007, Cooper 2010). However, as this research was particularly interested in the role of humans and humans' attitude towards handling risk and how they adopt innovative processes, it was an important factor that was touch upon by the main research question in several ways. Human factors were inevitably a part of the explanation to some of the differences in the safety culture as well as the levels of acceptance for innovation within the offshore and healthcare sector in Norway.

2.1.4. Cultural Maturity Model

In the literature many modes of measuring and evaluating organisational safety culture have been used. Some academics have measured different dimensions of safety culture by looking at incident reporting; as a measure of employees' perceptions of managerial commitment to safety (Zohar 2000, Mearns, Flin et al. 2001), or as an influence on safety behaviours (Clarke 1998), or as a measure of employees' attitudes towards safety (Rundmo 1992). Reason (1997)

saw enthusiasm for safety information systems among personnel as a critical measure of safety culture. As safety culture is a complex phenomenon the inclusion of several components of an organisation is needed to describe a complete safety culture (Reason 1997, Zohar 2000, Mearns, Flin et al. 2001). Some studies have, however, tried to capture multiple aspects; they typically look at a few in details and acknowledge the need to research the remainder (Cox and Cox 1996, Mearns, Flin et al. 2001, Sorensen 2002).

For this research, with the ultimate goal of defining potential implications for change, it was argued that a useful framework ought to include developmental aspects of safety culture. Therefor the work of Ron Westrum (Westrum 1993, Westrum 1996, Westrum 1996, Westrum 1999, Westrum 2004) was of utmost interest. He argued that to distinguish between different organisational safety cultures could be done by studying how well safety-related information was handled in the organisation. His theory included the definition of three types of cultures reflecting increasing levels of advancement in the way of how they handle information flow; named pathological, bureaucratic and generative (see Table 1.). Hale (2000) as well as many other safety culture academics have accepted Westrum's definition, and Hale stated his belief that for an organisation to reached a "true" safety culture it has to achieve the generative level of culture put forward by Westrum.

Pathological	Bureaucratic	Generative
• Information is hidden	• Information may be ignored	• Information is actively sought
• Messengers are "shot"	• Messengers are tolerated	• Messengers are trained
• Responsibilities are shirked	• Responsibility is compartmentalised	• Responsibilities are shared
• Bridging is discouraged	• Bridging is allowed but neglected	• Bridging is rewarded
• Failure is covered up	• Organisation is just and merciful	• Failure causes inquiry
• New ideas are actively crushed	• New ideas create problems	• New ideas are welcomed

Table 1. Westrum (1996) description of how different organisations respond to information in relation to safety.

The model developed by Westrum was brought forward by Hudson (2001) who further developed the theory building on the three levels originally suggested by Westrum. He re-labels the bureaucratic stage to the *calculative* as well as distinguishing two additional stages of cultural maturity; the *reactive* and the *proactive* levels. Hudson (2001) defines the stages as follows:

Pathological: Safety is a problem caused by workers. The main drivers are the business and a desire not to get caught by the regulator.

Reactive: Organisations start to take safety seriously but there is only action after incidents.

Calculative: Safety is driven by management systems, with much collection of data. Safety is still primarily driven by management and imposed rather than looked for by the workforce.

Proactive: With improved performance, the unexpected is a challenge. Workforce involvement starts to move the initiative away from a purely top down approach.

Generative: There is active participation at all levels. Safety is perceived to be an inherent part of the business. Organisations are characterised by chronic unease as a counter to complacency.

By this Hudson creates the cultural maturity model (see Figure 2.), showing how increased levels of understanding and awareness of risk and safety in combination with an increasing trust and openness within organisations allows it to climb in the advancement and maturity on the safety culture ladder.

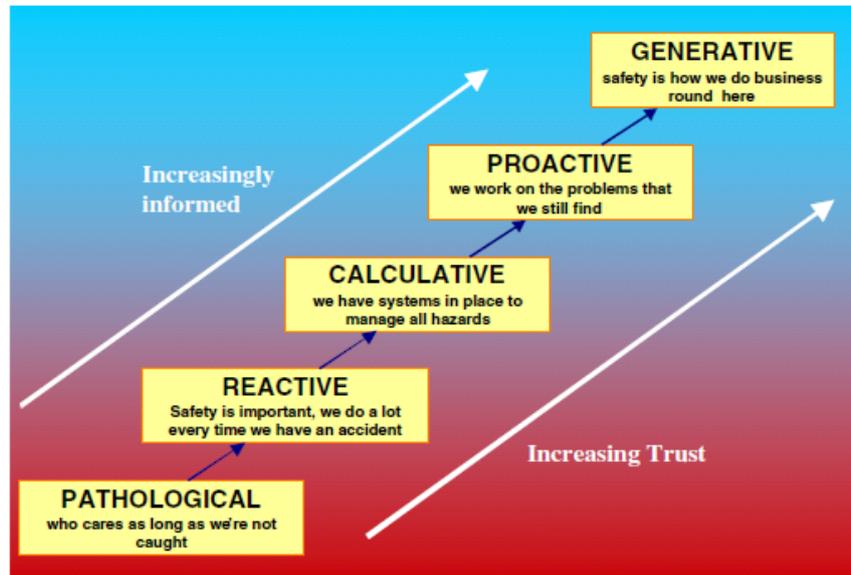**Figure 2. The evolutionary model of Safety Culture by Hudson (2001).**

Westrum's and Hudson's thinking about levels of safety culture advancement provides the basis for developing a framework of safety culture that takes into consideration a range of areas in which safety culture might manifest itself. For this particular research Hudson's (2001) model was used when assessing the safety culture maturity levels of the units of

analysis by looking at the way the organisations handled risk and safety information, how open and "trusting" the cultures appeared and by how informed the organisational members at different levels within the organisations were about risk and safety measures; modes of training, leadership involvement and general perceptions of safety related issues.

2.1.5.   Safety within the Offshore Industry and Healthcare Sector

The risk and safety situations within the healthcare industry and oil and gas industry are of course remarkably different. In the healthcare sector the safety concerns are mainly directed towards the public; the patients. Within the oil and gas industry there is a less apparent impact on the public; nevertheless it is clearly great concerns for environmental damage if unwanted events should take place. Therefore in the oil and gas industry a major part of the safety concerns are directed directly towards the employees themselves; the Piper Alpha disaster in 1988, when 167 people died, highlighted the direct dangers to offshore workers (Cullen 1993). However, indirectly also the healthcare providers can be harmed by unfortunate events, as through guilt and the feeling of having the responsibility of taking another humans life. The emotional distress of healthcare providers involved in medical errors can last for a lifetime and the negative psychological effects can be significant (Bosk 2003). So within both industries the employees will be affected by any unwanted events, and maintaining safety should be of great concern to all personnel.

In the early years of the oil and gas industry frequent fatal accidents were regarded as an expected part of the industry, though there has always been evident that the industry has taken their fatal accidents seriously. However, because of a strong societal pressure for increased environmental and occupational safety and a range of fatal accidents in the last three centuries there has been a considerable improvement in safety, leading to an industry that has become exemplary in its safety performance (Hudson 2001). After the Piper Alpha accident several safety requirements were recommended, including, for example, the establishment of the Offshore Safety Division of the Health and Safety Executive (HSE) and to improve the management of safety by the use of safety management systems (Cullen 1993). The oil and gas industy found that the management of safety could be combined with occupational health and environmental management, and this led to the implementation of integrated health, safety and environment management systems (HSE-MS). The industry's success in achieving such high levels of safety performance was argued by Hudson (2001) to have come mainly

from managements' uncompromising appliance of safety management systems (SMS); the systematic use of management processes to control the risk issues the industry faced. These systems involves to identify and assess of the risk of particular operations, the measurement of how those risk are should be managed, and what measures should be taken if an unfortunate situation should happen (Hudson 2001). By the experience gained from the many accidents it became evident to the offshore industry that saving money by taking risks was penalised too often. Accidents caused great environmental damage and societal protests, loss of human life and of vast amounts of money as the results. It became clear that this was not a tactical strategy. However, the management systems alone did not do the job to ensure safety. As seen in Figure 3, taken from a research paper on the implementation of safety culture in a multinational offshore organisation, systems could only reduce the number of accidents to a certain extent. They only defined the minimum common standards in form of systems, practices, and procedures, and it would not be enough if employees just unconsciously followed these. The next step towards a safe offshore industry was to create a culture within the organisation nurturing safety; a safety culture (see Figure 3.).
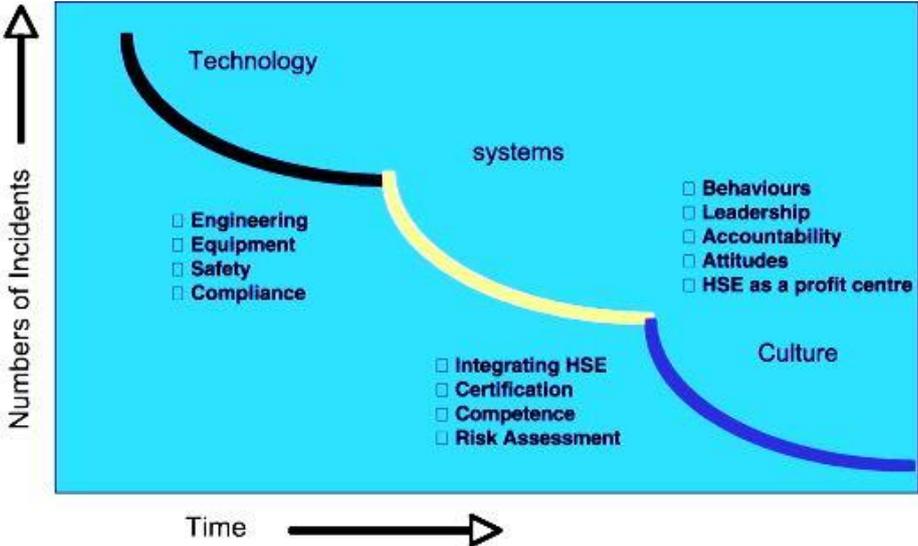
Figure 3. The developmental line, culture becomes the next wave after systems safety (Hudson 2007).

During the 1990's and the early 2000 many studies were conducted on human factors topics within the offshore industry, and problems associated with the safety culture were identified. It became clear that many of the safety systems and tools within the industry were only creating the wanted results in organisations or groups with an advanced safety culture (Hudson 2007). One step taken in the direction of creating a safety culture was to promote an

open an honest culture by developing investigation techniques that were to be performed in a blame free manner to direct attention away from the individuals and towards underlying causes and managerial failings (Wagenaar, Hudson et al. 1990, Wagenaar, Groeneweg et al. 1994). It became a standard within the oil and gas industry that all incidents were to be reported immediately to the management. Incidents were then categorised and ranked based on their potential damage, allowing minor or near-misses, which could have led to danger, to generate major responses. Such continued pressure and commitment helped to ensure a high focus on safety and was slowly changing attitudes from the top down within the industry. It might therefore be argued that the oil and gas industries can be defined as calculative reaching towards a proactive culture by the definition of Hudson (2001). The development of safety culture within the oil and gas industry, after the importance of a good culture became enlightened, has been a major focus area within the industry for the last century and is still a subject of improvement. By constantly improving their weaknesses they strive to create a truly proactive culture (Hudson 2003).

When considering safety within the healthcare environment it is generally related to the safety of patients; patient safety. The healthcare sector has seen a similar change in the focus of safety. However, the healthcare sector has been accused of accept high error rates, and of not taking this issue as seriously as other high risk industries (Bogner 1994, Kohn 1999, Reason 2001). The healthcare sector has always taken medical dangers seriously so the culture cannot be defined as pathological. Previously patient safety was regarded as the healthcare providers' responsibility, and therefore seen as something management could just expected to be present. This way of seeing patient safety left healthcare providers with the blame for any unwanted events without forcing management to reflect on how surrounding conditions may affect the errors that took place. More recently, based on increased assessing and information on the frequency of unwanted events in healthcare, there has been a change in attitude towards safety. During the last decade this better awareness has encouraged for understanding incidents underlying causes. However, the sector tends to respond with repair measures mainly to cases of serious outcome, and systematic improvements have not really been in focus (Hudson 2003). The lack of systematic risk management suggests that the culture can be defined more as reactive, though there may be argued for the occasional calculative area. However, this places health care some way behind the oil and gas industry in its apparent cultural maturity.

Since the 1990's a wave has spread internationally increasing the focus on patient safety. In Norway this led to healthcare improvement projects initiated through the Breakthrough Series Program by the Norwegian Medical Association in 1998. These efforts have been welcomed, but not funded, by the government. Another organisation, the National Unit for Patient Safety, was established in 2007, and in 2008 the first national conference on patient safety was organised in Oslo (Deilkås 2010). Evidently there was a rapid interest around patient safety in Norway based on the motion started in the international healthcare environment. This wave also started some governmental initiatives, such as the launch a reform, "Samhandlingsreformen," in 2009, meant to improve the coordination of patient services between hospitals and primary health care givers. Additionally, based on the experiences from Denmark and the USA, the Ministry of Health and Care Services decided to start a patient safety campaign "I trygge hender" (In safe hands) for Norwegian healthcare in the period of 2011 to 2013. The aims are to build lasting structures for patient safety, to improve patient safety culture in health care, and to reduce patient injuries with 20 % by the end of the campaign (Nasjonal-Pasientsikkerhetskampanje 2012). The government wants to reduce patient injuries by introducing mandatory measures in all hospitals for areas which are particularly susceptible to damage, such as medication errors and hospital infections. Throughout the campaign all health facilities in the country will be measuring patient injuries. Aggregated national figures indicate that about 16 % of patient who stayed at Norwegian hospitals in 2010 were exposed to at least one injury. If the figures are representative, this means that around 44 000 patients had prolonged hospital stay, and that around 4,700 died as a result of their injuries (Nasjonal-Pasientsikkerhetskampanje 2012). International studies show that it is likely that around half of such injuries are caused by preventable events and therefore can be prevented (The-Health-Foundation 2011). Though there has been advancement in the national focus on safety there is clearly still room for improvement within the safety of healthcare.

2.2. Innovation Adoption

Researchers have known for many years that acceptance of innovation is affected by an organisation's socially transmitted beliefs and attitudes toward novelties. An organisation's innovation adoption process is a very complex phenomenon and this makes it difficult to study. It is nonetheless possible to examine the features of an innovation affecting the modes of adoption as well as the organisational factors and measures posed to affect the innovation

adoption process. This section will inform the reader of this research study's focus when characterising and measuring innovation acceptance and adoption within its units of analysis. This section is separated into two parts; *Definitions of Innovation*; defining different types of innovation and outlining the scope of innovations focused upon in this research, and Innovation Adoption Process; discussing different modes of measuring innovation adoption and ultimately defining the factors of how innovation adoption will be measured within the units of analysis for this particular research.

2.2.1.   Definitions of Innovation

It can be easy to assume that an organisation that is doing or creating something new is an innovative organisation. Though defining innovation as creating or doing something differently from others is not entirely wrong, it does not capture all the traits of innovation and is therefore not the full definition. Innovation is an extensive concept and can be seen from a number of different viewpoints. Every different way of seeing innovation and conceptions of what the most important features are will put forward a different definition of the phenomenon.

Some decades ago it was argued that to meet the requirements of being "an innovation" it was not enough to have the element of novelty. An innovation also had to lead to adoption of the change by an organisation and by the relevant environments (Knight 1967). This is a step in the right direction towards an explicit definition, though it is still not complete. Therefore to be an innovation the idea needs to be new, and be adopted by and create a change internally in the organisation, as well as leading to a change externally in the underlying market, sector or state; "the surrounding environments".

However, there are other aspects that need to be taken into consideration. Firstly, the economically viewpoint; from this perspective an innovation is mainly defined by what economical growth the novelty can offer (Solow 1957, Nelson 1959, Levine 1997). Secondly, from the psychological perspective; creativity is of particular interest, and the change it offers in an individual's attitudes and actions (Nystrom 1979, Cropley 1999). Thirdly, the sociological viewpoint; where the focus on innovations impact on social structure and behaviours of our society is the most prominent (Gouldner 1957, Aiken and Alford 1970). During the resent years models combining these viewpoints have tried to explain the

involvedness of innovation (Galanakis 2006), to help prevent misinterpretations when defining innovation, and aid to avoid the wrong management decisions.

Additionally to the many viewpoints innovations can also be separated in a range of different classes and categories. Firstly, the level of change the innovation offers and how it effects the existing market parts innovations into incremental or radical innovations which are disruptive or sustaining. Incremental innovation describes novelties that not entirely new ideas, though offers modifications and improvements to present idea. Such innovations normally evolves the existing markets and value networks by increasing the value of the product/service, allowing the organisations within the market to compete against each other's sustaining improvements, and is therefore often termed sustaining innovation (Ali 1994, Bower and Christensen 1995, Bosk 2003). Radical innovations, on the other hand, introduce entirely novel ideas or inventions. With innovations like this follows the probability for eruption of entirely new markets or value chains. When the creation of a new market as a result of an innovation, causes disruption of an existing market or value network, the innovation will be defined as a disruptive innovation. Though radical innovations do not necessarily turn out to be disruptive innovations, generally disruptive innovations are found to be radical innovations (Markides 2006).

Innovations can also be categorised into different forms of innovations, such as; a new way of doing tings in form of processes, systems or protocols; the creation of a new product or service; or a new mode of organising intangible or tangible resources within an organisation. When innovating on the ways things are done within an organisation through creating new process or set of protocols, the outcome of the change is the factor affecting the market. A typical example of this is "lean manufacturing". This is a process improvement that became prominent after the Toyota Production System started to use this strategy, hence the term "Toyotism" (Womack 1990, Green 2000). Such process innovations are normally made to increase efficiency and reduce "waste" (avoidable use of resources), and is not necessarily meant to improve the product directly, though often it give the benefit of cost-savings for the product/service provider leading to a reduced market price for the customer. Contrasting, when looking at the creation of new products or services, product/service innovations, the novelty is unswervingly traded in the market, and the customers will benefit from the new technology, tool, system or service directly. The innovations involving restructuring intangible or tangible resources within an organisation can often be combined with a process innovation, and do not often change the final element for consumption. An organisational

structure or people innovation will instead often change the internal organisation of the responsibilities, teams, stakeholders or employees this can lead to a change in some processes though it is not a necessity. Such a change is often made to better utilise or increase the organisations resources, for example can intangible resources be improved by employing new and more qualified staffs or affect the existing employees' qualifications, attitudes or behaviour through training or education.

Additionally there are definitions of innovation in the terms of "bad" or "good", open or closed, or defined by the industry it exists in. Firstly, bad or good innovations are defined by their ethical net value for the society. This can be a challenging task as innovations that initially seem as "good" might ultimately turn out to be "bad" innovations, and vice versa. Take biofuels as an example; the intention, to cut the usage of fossil fuel to slow down the carbon emission, is clearly good. However, it can be discussed if biofuel is the best solution to the problem. Global gasoline prices are raising and it can be assumed that farmers around the world will devote larger and larger portions of their output to ethanol production. With the already existing issues of food shortages in parts of the world today, will decreasing the carbon emissions on the behalf of food production give the greatest net value for the earths population? Clearly this is a difficult question to answer. Secondly, when considering open or closed innovations, a closed innovation would be a novelty typically protected by patents or trade secrets, and that only benefits the originator firm. The new trend is however open innovation that, from the mid 1980's, became popular with the idea that; "We don't have to originate the research to profit from it" (Chesbrough 2003). This brought the concept of selling and licensing ideas and innovations between companies, and opened for a completely new mode of utilising innovation to benefit the society. Thirdly, defining innovations by their industries and how the innovation cycles in the industries are categorised. The healthcare sector, for example, involves a great concern with human safety and in Norway this sector is not recognised by high levels of competitiveness. Maybe because of these factors it has generated a slow innovation cycle and is generally considered to lag behind other industries regarding innovation. Also in other industries concerned with human safety, such as the oil and gas- and the aviation industries, the innovation cycle is also considered to be slow, and often takes several years. The oil and gas industry is recognised as one of the most conservative towards new technologies. Because of the great concern towards risks for human and environmental safety, and that innovations often come in form of complex new technologies that requires extensive testing of quality before innovations are utilised, the way

from "idea to business" is long and challenging. In industries with high levels of competition such as the ICT and car industry the innovation cycles can be much shorter, so it is clearly that factors such as the risk and safety aspects, innovation complexity and competition are among the important factors to consider when innovation is compared between different sectors and industries.

As this thesis studied safety culture in relation to innovation, a naturally choice was to focus on assessing mainly innovations intended to increase safety levels within organisations as a whole. In general such innovations are process innovations in form of new information technologies (IT), so when discussing innovation acceptance and adoption in the following sections the main focus was on IT innovations within an organisational environment.

2.2.2.   Innovation Adoption Process

To utilise innovative solutions, such as process innovations, are assumed to bring numerous of benefits and help organisations achieve increased safety levels, reduced costs, increased effectively, and gain competitive advantage. However, a considerable number of businesses who have implemented innovative solutions have not experienced the expected beneficial results. Waterson, Clegg et al. (1999) showed this in their research on several modern manufacturing practices in the UK. These companies had made innovative changes to their internal structures and processes, though not all of them succeeded in their change. The study demonstrated that after innovation as many as 50 to 60 % of the companies met their expected objectives only "moderately", "a little", or "not at all". Another reseach, a study on implementation of the innovative systems of Business Process Reengineering in 216 USA and Canadian hospitals, found that the majority of hospital executives expressed that the process reengineering efforts only succeeded to meet the anticipated objectives scarcely to moderately (Ho, Chan et al. 1999). So clearly innovation is not enough to progress an organisation, other critical contingencies that complement the innovations are essential for a successful change. Several contingencies have been recognised as important for an organisational innovative change. Emery et al., Detert et al. and Douglas et al. identified organisational structure, culture, and climate as important factors inflicting the success of change (Emery, Summers et al. 1996, Detert, Schroeder et al. 2000, Douglas and Judge 2001).

Organisational innovation research over several decades has generated numerous theories and studies on how to measure and anticipate adoption (Rogers and Shoemaker 1971, Damanpour

1991, Rogers 1995). As most industries in our competitive and pressured markets depends on high levels of safety, reduced costs and increased efficiency and quality, the introduction and successful adoption of new IT systems has become a essential element of organisations' competitive strategy (Porter and Millar 1985, Hazen and Byrd 2012). A wide range of studies have been conducted on the topic (Zmud 1982, Huff and Munro 1985, Grover 1993, Ramamurthy and Premkumar 1995, Lai and Guynes 1997, Menachemi, Burke et al. 2004, Van Grembergen and De Haes 2009, Walker, Damanpour et al. 2011), and the majority of this literature focus on factors and innovation elements that can predict adoption behaviour. Innovation research within the IT field has also attempted to build theories that integrate IT innovation with the general innovation theories. For example is the tri-core theory of Swanson (1994) adding to Draft's (1978) dual-core theory of technical and administrative innovation in organisations by adding several types of IT innovations. To mathematically model diffusion of innovation for different types of organisational innovations is also a crucial part of the innovation research. In such research where the rate of adoption is plotted over time the general finding is the well known bell-shaped curve of Rogers (1995), (2003), showing that at first, the adoption rate is very low; only few members of the social system or organisation adopt the innovation, then after some time the rate of adoption increase sharply. When the peak of the bell-shaped curve is reached the number of adoptions starts to decease until the maximum number of adopters is reached and the diffusion is complete (see Figure 4.).
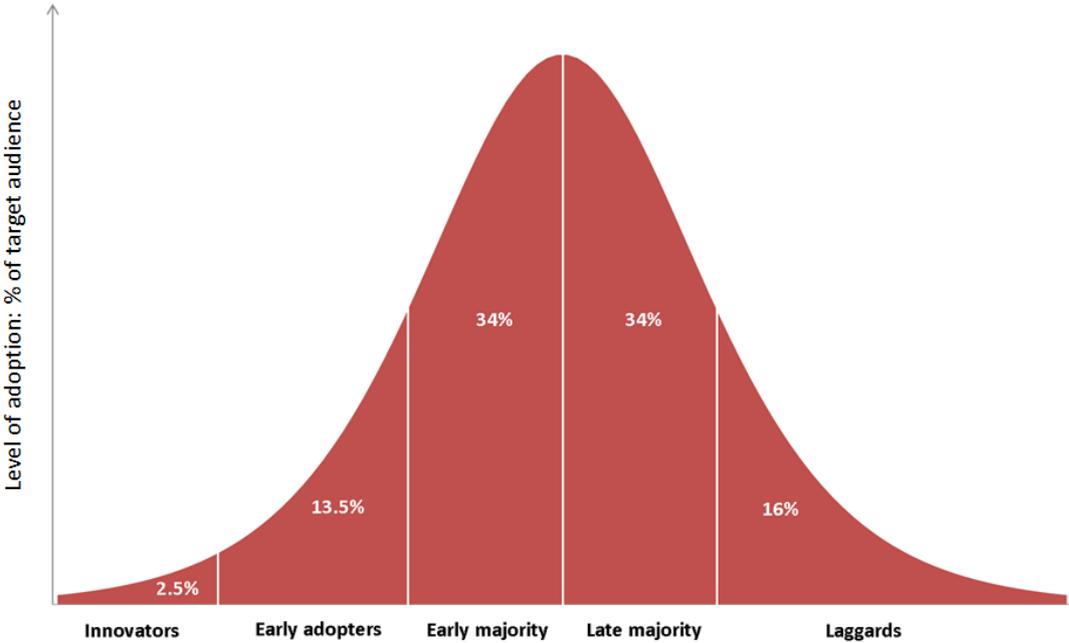

Figure 4. The Diffusion of Innovation Model, a redesigned copy of Rogers' (2003) original model.

Researchers have developed many different diffusion models presenting different forms of the adoption curve for different innovations. Some of the well known models for innovation diffusion include the Gompertz function and the Bass model, the external influence and the internal influence model as represented by the logistic curve model (Bass 1969, Rothman 1974, Lai and Guynes 1997, Meade and Islam 1998, Bass 2004). Nevertheless, the possibly most important contributions to innovation characteristics within the field have been the work of academics like Rogers (1995), Rogers and Shoemaker (1971). Rogers claimed in his literature that diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (or an organisation). The main elements in diffusion of innovation as described by Rogers (1983) are shown in Table 2.

Element	Definition
Innovation	An idea, practice, or object that is perceived as new by an individual or other unit of adoption.
Communication channels	The means by which messages get from one individual to another.
Time	*Innovation-decision period*; time required to make the decision, and *Rate of adoption*; the relative speed of adoption by members of a social system.
Social system	A set of interrelated units that are engaged in joint problem solving to accomplish a common goal.

Table 2. Elements in diffusion of innovation (Rogers 1983).

Some features considered as important for an innovation to be adopted by an organisation is features that represent interactions between the innovation and its context as perceived by the adopting entity. Rogers and Shoemaker (1971) consider three such features as very important for successful adoption; compatibility, relative advantage and complexity. According to Rogers and Shoemaker the compatibility of an innovation is "the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of the receivers." So in order for an innovation to be accepted by an organisation it should not inflict with the existing ideals and feelings of the adopting units. They further define the relative advantage as "the degree to which an innovation is perceived as being better than the idea it supersedes," meaning that in order for the organisational members to accept the innovation they have to understand the need of the new technology or system.

Finally they describe complexity as "the degree to which an innovation is perceived as relatively difficult to understand and use". This is underlining the importance of informing and training the organisational members sufficiently in order for them to feel confident in the use of a new system, this will also have a significant effect on their willingness to adopt the innovation. Tornatzky and Klein's (1982) literature review strongly support that these three features are essential by showing that they consistently influence innovation adoption and/or implementation in a significant number of published studies.

Rogers (1983) also underline the importance of the modes of an individual's adoption process by defining five stages; awareness, persuasion, decision, implementation, and confirmation. The awareness stage is the firs time an individual hear about or is exposed to an innovation. At this stage the person has no information about the innovation and has not yet become inspired to seek more information. However, this is where the first impression is created and the individual subconsciously create a positive or negative expectation about the novelty. In the second stage, the persuasion stage, the individual gets interested to seek more information about the new system/technology etc. and at this stage the person can get influenced on their initial assumption. This stage is therefore essential for the following steps of the adoption process as it is here a bad first-impression can be disproved, or a good first impression can be supported. The individual's perception coming out of the persuasion stage is directly affecting the next stage, the decision stage, and it is therefore essential for an organisation to make the right information available for its members to accomplish a successful adoption. During the decision stage individuals take the concept of change and weigh the advantages/disadvantages of using the innovation to decide whether to adopt or reject the innovation. However, in an organisational context this decision might not be up to the individual as it is normally an authority innovation decisions, meaning that the management has decided that the innovation will be implemented. Though, it is ultimately the individual's choice whether to follow management instruction or to violate organisational rules. If the individual, at the decision stage, agrees with the managerial decision this will clearly be of great interest for the organisation as a whole. After the decision follows the implementation, in this stage the individual test the innovation and decides whether it lived up to the expectations earlier decided upon. At this level of adoption the individuals can find that the innovation did not live up to the expectations, and fall back on the decision stage, or even find that the information they had received was not good enough for them to utilise the innovation, and fall all the way back on the persuasion stage to seek more information to help them better determines the

usefulness of the innovation. This is why sufficient testing of the innovation's quality and performance is so important, and why training employees is essential. In this way one can assure an effective organisational adoption where organisational members feel comfortable with the innovation when it is implemented and back lapsing in the adoption stages can be avoided. Finally, the confirmation stage is reached, and the individuals finalise the decision on whether to continue using the innovation. In an organisational context this might happen as a managerial decision determining that the system is to be continued or to be exchanged. In many cases this can lead to a forced acceptation of use and not a willingly adoption of the innovation among some organisational members. However, if all the steps of the adoption process are well planned and executed by management these undesired results can be minimised.

For this particular research the modes of innovation adoption were viewed based on the factors enlighten by Rogers et al. These theories were considered as the concepts best fitted for this study as they were the models of most empirical validation by previous research as well as including important factors of individuals' perception on innovation. In regards to the innovation adoption aspect, this research looked at the features of innovation in interaction between the innovation and its context as perceived by the adopting units in question. Additionally, it identified the organisational measures to promote the organisational members' innovation adoption process.

3. Research Design

The research design chapter was intended to lead the reader through the research process. The research design was created to justify the logic, structure and the principles of the research methodology and methods and how these relate to the research question and the propositions (Jupp 2006). The first segment was related back to the major research question. Here concrete research propositions were defined to ultimately help answering the major research question. The second segment deliberated on the research method used, and finally the third section designated the units of analysis used for this research.

3.1.   Research Direction

As defined in the commencement of this report, the ultimate goal of this study was to investigate the relations between safety culture and acceptation for innovation.

When studying this question it was of interest to look at the differences in the safety culture within the two sectors studied. To identify differences in culture it was relevant to look at the formal risk and safety control processes, and understand the managements' managerial role in the safety process. Recognised differences in the safety management process were linked to differences in the safety culture within the two sectors. The research looked at how attitudes in regard to risk and safety by management and personnel differed between the two sectors. This was compared and linked to how managers and employees in the offshore and healthcare industries felt about innovative processes and new technology. Ultimately this suggested whether the maturity level of the safety culture does affect the way an organisation adopt new technology and processes.

In the literature chapter Woodward's et al. (2004) argue that an advanced safety culture is a culture that is open and fair. To point fingers and blame the individuals responsible of error is not considered positive when trying to advance in safety, as a destructive "blame culture" is strongly working against the culture towards safety within an organisation. The oil and gas industry has been working intensely to improve on this area, and literature claims that it has become a standard within the industry to utilise investigation techniques that direct attention away from the individuals and towards underlying causes and managerial failings. However, in the healthcare industry it has been a culture for giving the responsibility to the individuals making the mistake, and a blame culture has for long been evident, despite an increased

understanding of the importance of a "fair" culture. Other factors argued in the literature to be evident that the offshore industry has a more advanced level of safety culture compared to the healthcare industry is that there has become a high focus on changing safety attitudes within the industry, by changing leaders' attitudes to eventually get a change in the organisational members' attitudes. It has been claimed that the offshore industry has reached the borderline between a calculative and a proactive culture, as defined by Hudson (2003). Though the healthcare sector, with its lac of systematic risk management, is indicted to lag behind the offshore industry in its culture maturity, and has been recognised to have more of a reactive safety culture (Hudson 2003). The researcher therefore drew the following proposition:

Proposition 1: "The offshore company's safety culture is more advanced compared to safety culture found in the healthcare organisation."

As explored in the literature review researchers seem to agree upon the importance of management commitment to safety at all levels in order to create a "good" safety culture. To create an open and trusting environment leaders of an organisation need to express interest and involvement in the work environment and safety of their employees through training and instruction, as well as commitment, motivation, supervision, and responsibility. These factors have also been suggested to be of importance for implementation of innovation and change. Therefore the second proposition was proposed as follows:

Proposition 2: "Leadership interest and involvement positively affects the safety culture and innovation adoption processes within the offshore and healthcare industries in Norway."

When looking at adoption of innovation the two industries in question were both recognised as generally conservative. Their innovation cycles are "*slow*", as described in the literature chapter, mainly caused by the by the great concern towards risks for human and environmental safety. Though, it can be claimed that the oil and gas industry has a longer experience with innovation and change, and that this industry has seen greater improvements because of their innovative processes when compared to the healthcare sector. Based on the features of successful innovation adoption by Rogers and Shoemaker (1971) two of the features can be considered to be in favour for the oil and gas industry; the compatibility and the complexity. The compatibility will be easier to receive in this industry as its organisational members are used to continuous change and improvements, and in general have positive experience with change. The complexity feature is minimised because individuals are used to learn about new systems and to use new technology. In the healthcare sector past experience

might not have been only positive, and the personnel are not as advanced in the use of complex technologies. This was therefore translated into the following propositions:

Proposition 3: "It is a more positive environment for innovation adoption in the offshore industry than what is found in the healthcare sector."

Proposition 4: "Innovation increases the safety levels in the offshore and healthcare sector."

3.2. Research Method

There are several approaches that can be used to complete a research study, the major methods are experimental research, action research, case study, survey, archival analysis and history research (Yin 2003, Wilson 2010). The type of research question, the extent of control that the researcher has over actual behavioural events and the degree of focus on contemporary as opposed to historical events are three essential factors that defines the most suitable choice of research method for a research study according to Yin (2003). In this research study the question being posed was within the type of "how" questions; "How does the cultural attitude towards risk and safety in the Norwegian offshore industry and healthcare sector affect their innovation adoption processes?" In other words, it attempted to identify how one attitude interacts with another.

To decide of the appropriate method of studying the research question one first had to assess the degree of control the researcher had over the behavioural events. In this research the answer to this question was hard to determine. Both safety culture and innovation adoption are defined by the attitudes of every single member of an organisation, though it can be argued that organisational leaders have some control of how their organisation's members behave and think about risk and safety, and how they feel about new technologies. If they had no modes to affect these two behavioural events it would be worthless to study them at all, as any implications found would not be applicable. However, this study's researcher's degree of control to affect interaction between safety culture and innovation acceptance within the two companies during data collection was close to zero. In comparison to for example practical research experiments in a laboratory there were a low degree of control over the behavioural events.

When then looking at the degree of focus on contemporary as opposed to historical events, it could be argued that the topic studied was of the contemporary nature. Attitudes towards risk and safety has probably been existing unconsciously as long as any human culture has existed, however it is only during the last few decades it has become defined as the term "safety culture", and has been illuminated and discussed among researchers and within organisations. Innovations have also been evident since very early ages, though it was first in the 1960's a greater focus on the psychology around it evaporated. Moreover, the connection between safety culture and the innovation adoption process has only to a small extent been explored, though the subjects on their own are getting an increasingly focus within the field of business research.

Even though several methods of research could have been used to enlighten the research question, Yin (2003) states that when a contemporary set of events which the researcher has little or no control over is defined as a "*how*" the method of doing a case study can give great advantages. Case studies are widely used in sociology, in organisational psychology, and employment relations, among other fields (Cassell 2004). As this research was aiming to understand the experiences and attitudes of management and employees within two different industries the case study design was a good method to obtain empirical information. A case study gives powerful means to portray a business culture to outsiders, and is often chosen as a research design for studies that wants to make practical improvements in an industry or in the society. Case study evaluations, using one or more qualitative methods, have been used to investigate important practical and policy questions in healthcare (Keen 1995).

Research studies can according to Wilson (2010) be described as exploratory, descriptive or causal. As the research of this study was not intended to necessarily establish a causal relationship between the two events studied it could not initially be described as a fundamentally causal study. Nevertheless, the research was trying to identify a cause-effect relationship and aimed to describe the link between two cultural attitudes, though not necessarily evidence a causal relationship, which did indicate that it was a casual study. However, there had previously been done little investigation about the correlations between safety culture and innovation acceptance, which was the central interest of this research study, this implied that the research was of an exploratory form. Though, both areas independently have been thoroughly studied, as presented in the theory chapter. Because of this there was a solid theoretical framework to base the research on, and as the ultimate aim of the study was not to generate future research directions, could not be identified simply as an exploratory

study neither. The absolute goal of this research was to form the basis of simple decision-making by answering a "how" question to advice on implementations and knowledge transfer between the two sectors studied. This would indicate that the research could be determined to fall under the descriptive research category. However, as the research was trying to identify a relationship between two factors that had not been studied extensively before, and was based only on in-depth interviews within two organisations, the legitimacy of being conclusive grounded on this research alone was minor. All correlations and implications recognised would require further studies to allow conclusiveness and ultimately the study was leaning towards being exploratory.

Therefore it was decided that an exploratory case study would be the appropriate design for this research in order to establish link a between the research question and the interpretations of any correlations found.

Finally it was to be mentioned that, based on the fact that the relation between safety culture and innovation adoption was not a renowned debate within academic literature, it was assumed that the reader would not be familiar with both of these phenomena. Therefore the researcher made a deliberate choice of writing an extensive and descriptive literature review.

3.3. Units of Analysis

The units of analysis for this study were selected using information-oriented sampling. In oppose to a random selection of units to be studied, information-oriented sampling is to intentionally select the cases to be studied based on predefined criteria (Flyvbjerg 2006). When the goal of a study is to attain as much information on a given phenomenon; picking a random sample of units to be studied might not be the most benefiting method. Therefore it was of the interest of the researcher to choose "extreme cases" (see Table 3.) as they often can reveal more information "because they activate more actors and more basic mechanisms in the situation studied" (Flyvbjerg 2006). As this research is more interested in understanding the deeper causes and the consequences behind the research question than to describe the symptoms of the problem and how frequently they occur it is more appropriate to select some few cases chosen for their validity. So to maximise the utility of information form a small samples the cases were selected on the basis of expectations about their information content.

Strategies for the Selection of Samples and Cases	
Type of Selection	**Purpose**
A. Random selection.	To avoid systematic biases in the sample. The sample's size is decisive for generalisation
1. Random sample	To achieve a representative sample that allows for generalisation for the entire population.
2. Stratified sample.	To generalise for specially selected subgroups within the population
B. Information-oriented selection	To maximise the utility of information from small samples and single cases. Cases are selected on the basis of expectations about their information content.
1. Extreme/deviant cases	To obtain information on unusual cases, which can be especially problematic or especially good in a more closely defined sense.
2. Maximum variation cases	To obtain information about the significance of various circumstances for case process and outcome (e.g., three to four cases that are very different on one dimension: size, form of organisation, location, budget).
3. Critical cases	To achieve information that permits logical deductions of the type, "If this is (not) valid for this case, then it applies to all (no) cases."
4. Paradigmatic cases	To develop a metaphor or establish a school for the domain that the case concerns.

Table 3. Strategies for the Selection of Samples and Cases (Flyvbjerg 2006).

From the literature research on safety culture there were three industries that exceled as the sectors in focus within safety culture research; healthcare industry, aviation industry and offshore industry. When investigating literature on innovation acceptance both the healthcare sector and the offshore sector seemed more predominantly investigated. Additionally, DNV could provide more information on these two sectors compared to the aviation industry. Therefore as the researcher had more information and understanding of the healthcare sector and the offshore industry and with the limited conditions of the research it was decided that only those two sectors would be studied represented by one case from each sector. Therefore one big organisation from each sector was selected as the two research units; one hospital and

one offshore company. If a multiple case design had been chosen, including a third or fourth case, it would have become an unbalanced level of insight between the cases; this could potentially have introduced a bias. Therefore it was a deliberate choice of the researcher to make an in-depth analysis of two cases instead of a shallow and unbalanced analysis of additional cases. To reduce the threat to reliability that a case study of only two cases inherently has, multiple informants from different functional areas and level of seniority form each case were used to collect information. Whereas the two units of analysis were the hospital and the offshore company, a number of different members of each organisation were the units of data collection.

Even though the selected cases were not the only environments where information about the relation between safety culture and innovation acceptance could be very relevant, these cases were particularly significant cases in various aspects. They were significant because; changes in these industries, in form of an ever increasing demand, encourages the use of innovation and new technologies in order to be able to fulfil the demands; there have been many undesirable incidents in both sectors the last decade leading to an increased focus from the public on their safety levels, and ultimately increasing the focus on safety culture and risk management within the two industries; and finally they are both sectors which would benefit from industry standardisation in new systems and cultural attitudes. By selecting cases strategically in this manner this research could offer higher probabilities for generalisation when it came to the conclusions on the main research question (Flyvbjerg 2006).

Because of the possibility of sensitive information being reviled during the data collection, confidentiality letters were signed by both parties to secure the anonymity of the companies and the informers from both cases. This was a deliberate decision made by the researcher in order to allow an open dialogue with the informers, to reduce any bias or secrecy and to get a more trustworthy dataset.

4. Data Collection

This chapter was proposed to outline how preparations where done before collecting data, what data were gathered and eventually how it was collected. This was done to increase internal reliability of the data, to assure that the research and the data presented were measuring what they were proposed to measure and to make the result as close as possible with the actual real-world situation.

4.1.　　Data Type and Data Collection Tools

As of being a case study, which was analysing a contemporary phenomenon, it was possible to make use of both primary and secondary data to enlighten the research question. As of the researchers best knowledge there was no previous studies done on how safety culture might effect the accept for innovation, therefore collection of primary data was believed to be the most appropriate data to base this study on. According to Wilson (2010) collecting primary data aimed at a case study can best be done through; interviews, questionnaires and observation.

It is argued that a major strength of the case study data collection is that it offers the opportunity to use diverse modes of collecting evidence (Yin 2003). Research on culture has previously also been done in form of questionnaires, though these does not offer the personal relation between the interviewer and the informant that a interview offers, also when discussing a subtle topic such as attitudes and behaviours are questions could easily be misinterpreted with the consequences of inaccurate data or questions left unanswered (Wilson 2010). As this research was searching for behavioural and attitudinal factors, observation could also have been a relevant mode of collecting primary data. However, the researcher deliberately decided not to utilise this tool for two key reasons. Firstly, because of the sensitivity around attitudes in regard to safety it was likely to assume that the researcher's presence would evoke a different behaviour by the observed subjects. Additionally, it was considered challenging to do observations within two chosen units; in the hospital this would contrary with the ethical lines regarding patient privacy policies, and to enter an operational site within the offshore company the researcher would be obligated to complete a complex safety course. So be cause of the limited conditions for this research observation was not considered the most time effective mode of collecting primary data, providing only marginal

contribution to the study's overall quality. As interviews are known to allow a researcher to gain insight into a person's beliefs and attitudes towards particular subjects (Wilson 2010) this mode of collecting data was of great relevance for this research. As this research was aimed to understand the deeper causes and the consequences behind human attitudes and behaviour interviews were the collection method that eventually was considered the most applicable.

A key advantage of interviews is the one offered by face-to-face interviews which gives the researcher the opportunity to examine both verbal and non-verbal communication (Wilson 2010). In this type of interviews the conversation can also be recorded, offering a more accurate transcript of the information afterwards. Additionally, it offers a great flexibility regarding the delivery of the questions, so the questions can be asked naturally within the conversation making the interviewee feel that it is more a conversation than a direct questioning. If a question is unclear for the informer it is easy for the interviewer to notice that rephrasing the question is needed through non-verbal observations of the body language of the interviewee, and any misinterpretations of questions could also easily be clarified. As of the subtle topic to be discussed for this research it was therefore a deliberate decision to conduct interviews in a face-to-face manner as far as this was possible.

4.2.   Interview Structure and Questions Design

The way the interviews are structured and the questions to be asked during the interviews are crucial to draw the line between the research question and the research answers. Therefore there were put a considerably amount of effort into planning for the interviews. Interviews can be structured in three different manners; (1) structured interviews; a predefined set of questions leading to short concrete answers, (2) unstructured interviews; encouraging the interviewee to discuss a certain topic with no pre-set questions prepared, (3) and semi-structured interviews; the combination of both unstructured and structured, allowing the interviewee to elaborate on certain points and also give the interviewer the opportunity to ask follow-up questions regarding topics brought up by the respondent that is of interest for the research (Wilson 2010). As this research was studying an internal phenomenon within the organisations that was not beforehand entirely understood by the researcher, the flexibility of a semi-structured interview method was preferred. This method offered the opportunity to learn about sides of the research question the researcher could not have identified as essential before the interview. Nevertheless, it also provided the ability to guide the respondent through the conversation by pre-set backbone questions.

The design of the questions themselves is also of utmost importance. In this regard it was useful for the researcher understand the use of different types of questions by using Yin's (2003) five-level framework; (Level 1) questions asked of specific interviewees; (Level 2) questions asked of the individual case; (Level 3) questions asked of the pattern of findings across multiple cases; (Level 4) questions asked of an entire study – for example, calling on information beyond the case study evidence and including other literature or published data that may have been reviewed; (Level 5) and finally normative questions about policy recommendations and conclusions, going beyond the narrow scope of study. As the researcher wanted to guide the interviewees to talk about the topics of interest for the research, however not limit them to only discuss topics that the researcher in advance believed to be the most important factors, all the five question types were utilised. This allowed the researcher to identify essential factors of interest that, based on inadequate insight to the organisations, could not have been identified before the interview. Additionally, it was of utmost importance to consider the issue of biased questions, leading interviewees to respond in the manner the researcher wanted to approve her preconceived assumptions. This was a difficult task, though, it was strongly considered during the question design process. Experienced interviewers from DNV assisted during this process, and the backbone questions developed were eventually assumed to be qualified to conduct an unbiased interview. The final generalised backbone questions were given in APPENDIX. The questions presented there differed from the questions used for each interview, as every interview was targeting the interviewee in question, and also additional follow-up questions evolved as underlying topics were explored during each interview. Therefore not all the questions were literally represented in APPENDIX.

4.3.   Data Collection

The empirical sources of data for this research were the interviews conducted within the two units of study. As described above both face-to-face interviews and focus-group interviews were used to collect data. Though not considered ideal, one interview was conducted by sending the backbone questions through email. This was because a last-minute respondent was located at a different site in the country. It became evident that this mode of interviewing did not offer the benefits of a face-to-face interview. The possibility to engage in both verbal and non-verbal communication was not offered, neither the great flexibility on delivery of questions. In this transcript the answers were clearly shorter and some questions were left

unanswered, however it gave some additional information and brought in perspectives that benefited the research.

The interviewees that were targeted for the research were leaders holding key positions connected to HSE responsibilities within the two sectors, as well as employees working with (or having experience from) practical applications within the two organisations. From the hospital the chief of quality and one of the hospital division leaders was interviewed, along with three nurses from different departments within the hospital. The researcher wanted the interviewees to work in different locations to decrease the danger of being coloured by local cultures and attitudes, and ensure to get a more generalizable view of the organisation as a whole. These interviews were all completed in a face-to-face manner between the researcher and one interviewee at an office within their own work site. In the offshore company three leaders holding key positions connected to HSE responsibilities, three employees with experience from working offshore, and two employees working as offshore operators were interviewed. All worked or had experiences from different departments and sites within the organisation. Two focus-group interviews were conducted in undisturbed meeting rooms at two different main offices in Norway. One interview including two HSE leaders and two employees with experience from working offshore, and the other including one leader holding a key position connected to HSE responsibilities, one employee with experience from working offshore and one current offshore operator. The last offshore operator was, as mentioned, interviewed by email because of time and travel considerations. The face-to-face interviews lasted from 40-60 minutes, and the focus-group interviews lasted for approximately 1 hour and 30 minutes.

The interviews were conducted, as planned, with a backbone based on the theory presented in chapter 2. The backbone interviews were made to discuss certain areas assumed by the researcher to be of importance, and enlighten other factors of importance in order to support or decline the propositions presented in chapter 3. As already mentioned the questions were discussed and rewritten several times in cooperation with specialists within the field from DNV.

All interviews were recorded so that they could be listened to, transcribed and analysed more thoroughly in the analysis stage. The analysis of the transcripts was the basis for the qualitative conclusions that follows in the next sections. As mentioned before a letter of confidentiality was signed with each interviewee to ensure them about their anonymity and

that the information given would be used for the purpose of this study only. This was done by the researcher to protect the informants and allow them to speak more freely about their actual attitudes, beliefs and opinions. Hence, this report did not contain any information about the identity of the organisations studied, nor about any of the individuals interviewed, and the literal interview transcripts were not presented.

4.4. Data Analysis Strategy

The four-step process for analysis of qualitative interviews presented by Wilson (2010) was used to analyse the data collected; (1) transcribing data, (2) reading and generating categories, themes or codes, (3) interpreting the findings, (4) and finally writing the report.

The first step was completed as soon as possible after each interview, within one week, in order to have the interview fresh in mind to illuminate any misinterpretations of the recorded data. Also the interviewees' timing, voice tone, etc., which may provide additional information about their degree of certainty and the strength of their opinions was commented in the transcripts in order to not exclude any valuable information that could be illuminated by this.

In the second step of generating categorises the transcripts were read repeatedly to identify answers of correlation in order to define sub-topics of interest for the research. This research was designed to make interviewees express their beliefs and feelings around the two topics of interest. Therefore the questions were intended only to explore if the researchers assumptions around certain subjects were of relevance to the final research question. Hence, the answers were not simply categorised based on a group of questions, making the job of identifying actual correlations in attitudes and behaviour a challenging task. The data was therefore broken up to two parts; one describing information identified as relevant to conclude on attitudes and behaviour towards risk and safety, and one unfolding the information collected around innovation adoption. Within each part the topics of most relevance for answering on the propositions were presented and discussed, as can be seen in the third and fourth steps which are described in the following chapter.

4.5.   Ethical and Reliability Considerations

The researcher intended to be an external viewer of the units of analysis and she had never been considerably involved in either of the two sectors in question. However, because of studying previous literature about the two industries before conducting the research, preconceptions and opinions about the units of analysis might have subconsciously appeared in the researcher. This was not desirable as the researcher ideally should be completely unbiased. According to Yin (2003), case studies are especially prone to this problem because the researchers must understand the issues beforehand, and therefore are required to investigate literature and other sources before conducting their study. However, the researcher of this case study had an intrinsic motivation of seeing the relation between safety culture and innovation adoption processes, and would therefore not benefit from advocating any supposed biases of either safety culture or innovation adoption within the units of analyses. In order to reduce the inescapable doubt from the reader, sources external to the researcher's observations were used for data collection and the research question was linked to the empirical evidences through a clear and transparent presentation ultimately linking to the conclusions throughout the research study.

Ethical questions arose from the fact that the topics in focus; safety culture and acceptance of innovation, are psychologically difficult topics to discuss. Therefore some considerations concerning the psychological reaction of the interview subjects had to be mentioned. It is not easy for an individual to speak openly about own potential negative attitudes or behaviour when it comes to the safety of others. Neither is it easy to blame one's co-workers or employer for violating safety measures or ignoring safety concerns. To try to minimise the influence of such bias a letter of confidentiality were signed with each informant from both units of analysis. Privacy and confidentiality of the respondents and their organisation where promised by researcher, and were fully respected so that absolutely no one taking part in this study as a respondent or contributor were exposed for the public.

Finally it was important to mention that the sample size of this case study was limited. The research was conducted in two organisations of two large industries with high internal variance in safety culture and modes of innovation adoption. Therefore the results of this study alone could not be generalised to anticipate attitudes and behaviour within these or other organisations and industries. The result could only be representative for the subjects and instances studied in this particular research, and the findings may not apply to other similar

case studies. Additionally, as the research represented depth of information, rather than breadth, it could not be expected to reach rigorous conclusions or determine precise relationships between the two industries studied. The findings would only allow to back up or decline the propositions in order to theorise around whether safety culture do in fact affect innovation adoption processes, as well as potentially underline subjects of interest for further investigation.

5. Data Analysis and Discussion

To investigate the relations between safety culture and innovation adoption processes within the offshore industry and healthcare sector in Norway the research aimed to understand and identify the levels of safety culture within the two units of analysis. Based on the theoretical review essential features to study safety culture were identified and presented under the title "Safety Culture and Regulations in the Hospital and the Offshore Company"; (1) how formal policies and regulations manage safety defined as "Safety Regulations and Control", (2) how competence and knowledge about risk and safety are conveyed through training and management involvement defined as "Safety Training and Leadership Involvement", (3) and additional safety culture factors such as perceptions of safety and blame culture by organisational members, changes in safety culture during the resent years and main challenges to safety as perceived by the informants under the section "Safety Culture". At the end of this section the findings were discussed in the light of theory and Proposition 1 and 2 were evaluated.

To assess the features of innovation adoption processes in the light of safety culture the research limited it focus to assess process innovations in form of new information technologies intended to increase safety levels within the organisations. To study these innovations Rogers (1983) and Rogers and Shoemaker (1971) theories were utilised. Therefore features of importance for successful adoption (compatibility, relative advantage and complexity) and the managerial efforts to enhance the five stages of the innovation adoption process (awareness, persuasion, decision, implementation, and confirmation) were assessed. The data analysis was presented under the title "Innovation Adoption in the Hospital and the Offshore Company" as follows; (1) the enthusiasm and attitudes toward innovation among the organisational members defined as "Engagement in Innovation", (2) important features with innovations and how they are implemented that affect the organisational adoption process defined as "Factors of Successful Implementation", (3) and finally how risk and safety are affected by the implementation of new process innovations within the organisations defined as "Innovation's Effect on Safety". To sum up this section the findings were deliberated based on Rogers (1983) and Rogers and Shoemaker (1971) theories. In this discussion the aim was to approve/disapprove Proposition 2, 3 and 4.

The structure of the data analysis and the discussion is illustrated in Table 5.

Safety Culture and Regulations	Innovation Adoption

- **Safety Regulations and Control**
- **Safety Training and Leadership Involvement**
- **Safety Culture**
   Discussion of Proposition: 1 and 2
	- **Engagement in Innovation**
	- **Factors of Successful Implementation**
	- **Innovation's Effect on Safety**
	   Discussion of Proposition: 2, 3 and 4

Table 5. Structure of Data Analysis and Discussion

5.1. Safety Culture and Regulations in the Hospital and the Offshore Company

Researchers have known for many years that safety performance is affected by an organisation's socially transmitted beliefs and attitudes toward safety; the organisations safety culture. The safety culture of an organisation is very complex and consists of factors such as; the organisations framework of policies, regulations and values; leadership involvement through communication, training and instruction; openness, trust and awareness; and organisational members attitudes and behaviours. In this section the empiric data on safety culture and regulations from the two units of analysis were introduced. The data analysis was presented under three titles (1) Safety Regulations and Control, (2) Safety Training and Leadership Involvement, and (3) Safety Culture, see Table 5.

Safety Culture and Regulations
- **Safety Regulations and Control** - **Safety Training and Leadership Involvement** - **Safety Culture**   **Discussion of Proposition: 1 and 2**

Table 5. Structure of Data Analysis and Discussion for Safety Culture and Regulations

The main goal of this section was to gain an impression of the safety culture within the two organisations studied. To sum up this section the findings were discussed in the light of theory, and Proposition 1 and 2, as defined in the Research Design chapter, were deliberated upon in the light of the empirical data collected.

5.1.1. Safety Regulations and Control

From the literature it becomes clear that a good organisational safety culture is depending on the framework determined by organisational policy and by managerial action. Though just as important it is how the individuals working within this framework are responding to it. So there are a need of formal procedures, systems and routines, and these are to be followed and utilised in a good manner by the organisational members. To advance in safety and safety culture an organisation is dependent on being a learning organisation, where communication and sharing of information comes naturally and changes are made to respond to the information received. So to get an impression of the framework for safety within the organisations analysed it was important to investigate their internal safety measures and at what level they are communicating and responding to information regarding safety.

5.1.1.1. How Safety is Ensured

When asked about how they ensure that safety standards are met the two hospital leaders immediately focus on the department leaders' responsibility in ensuring a high standard of patient safety at the site of service. They include that quality is also the responsibility of every single healthcare professional "it is in the meeting between healthcare providers and patients the actual quality is created and it is here the potential for unwanted happenings or a high quality is found." Safety is the responsibility of leaders at all levels within the hospital; department leaders make sure healthcare providers do their job correctly and that they report if something is wrong, then division leaders along with the Committee on Quality and hospital quality workers have the responsibility to take action on the reported incidents to decide upon measures to improve the conditions that made the incident happen.

Safety is regulated and controlled by government regulations, and supervisory authorities come to do revisions and controls of the hospital, and there are also annually inspections on the condition of technical medical equipment externally by DSB (Directorate for Civil Protection and Emergency Planning). Internally the quality and patient safety are controlled by the Committee on Quality, the Patient Selection (user representatives) and the hospital's Quality Unit. When serious incidents are reported both the internal and external controllers can be involved in revisions and audits, depending on how severe the event is. In the case of incidents that did or could have led to serious damage to a patient the hospital is required to inform the Norwegian Knowledge Centre for the Health Services (NOKC), and in the case of

unexpected deaths they are obligated to also notify the Board of Health in the government as well as the police.

The nurses confirm that there have been some revisions in connection to reported events, however they have never experienced impromptu inspections or controls. One of the nurses is pointing out that this probably has an effect on how they do their job "there are no overseers controlling whether we do the patient visits in the hallway and things like that… that might be the reason why the rules might not be taken so seriously, because there are no consequences… there are no one controlling us, notifying us or watching what we are doing." They do have internal medication counts and controls of emergency protocols, also regular external controls of fire safety is mentioned, though no external controls of the safety culture have been experienced by any of the nurses.

When the nurses are asked about how they feel the hospital management engage in patient safety work, they are not sure how to answer. The impression is that they believe that the management is doing a good job, though they are not sure of the details. One of them mentions the focus that has been on hygiene recently, highlighting the importance of always washing your hands. One of the others informs about an obligated privacy policy course that she and her colleagues in the department are having, though there have still not been enough time for all of them to have it. Though, they express that it does not feel like the management have fully insight in how it is to work in the patient treating departments "there is too much to do, things must go faster than planned, and thus at some point so there will be a difference between the requirements, or expectations, and what we actually are able to do." So they do not feel the protocols and systems are enough adapted for the busy environment they work in.

In the offshore company safety is also the responsibility of every employee within the company. Leaders have the overall responsibility for safety, on a ship this will be the captain and on an installation this will be the Offshore Installation Manager. However, all the interviewees underline that in the resent years it has become clearer that HSE is a responsibility of every single employee. "Safety culture is important for everyone in the company, and it is something that we train on a lot in the company, both on installations and vessels. It's all about getting a good culture to "settle in the backbone" of every employee." When planning and building new platforms and installations, there are leaders with a main responsibility towards ensuring quality and safety, HES leaders. They have the supervisory role, making sure that safety and risk is always taken in to account through the planning,

design and executing phases. Additionally there is a company committee from outside the project that controls that things are done in accordance with the requirements. If it appears that the project is unable to meet a requirement the HSE leaders have to contact the committee and they decides whether if the project can continue or has to be put on hold until the issue has been solved.

The safety in the offshore sector is also regulated and controlled by government regulations. Petroleum Safety Authority is the regulatory authority for technical and operational safety and for the working environment in the offshore sector in Norway. Their regulatory role covers all phases of the industry, from planning and design through construction and operation to possible ultimate removal. They are the supervisory authorities and can come to do revisions and controls of the company sites. One of the HSE leaders expresses; "I feel it is the government of Norway that actually has pushed the work on safety within the sector. It's the Petroleum Safety Authority and their requirements pushing the company forward." Some of the interviewees inform that the government has started to standardise some protocols in the sector, such as the Safety Job Analysis tool; a risk assessment tool used to identify and control workplace hazards with the aim of preventing harm to any human involved in operation or in range of potential risks. They feel that this is a step in the right direction, and that the sector would benefit from having more standardisations in systems and protocols. This argument builds on the fact that the offshore companies based on the Norwegian Continental Shelf uses several of the same subcontractors, meaning that the operators from the contractor firms work periods at different sites within different offshore companies. If then all technical systems and protocols were standardised they would not have to learn to use a whole new system every time they change working site.

Some of the leaders with experience offshore also have the impression that not all the subcontractors are good enough to ensure of the quality they deliver. Though it is demanded and stated in the activities regulations of the Petroleum Safety Authority "they do not follow up, they do not have own verifications or good enough monitoring plans, and they leaves a bit too much of the work to ensure safety and quality on the offshore companies them selves."

The offshore company therefore monitor both their own employees as well as the contractors. These verifications can be done both by internal members and by third parties hired to do the controls. They measures how good leaders are at keeping control of things and implement

management requirements, and that the staffs qualifications are good enough, how they follow procedures and whether they work according to the rules and regulations.

There are also a range of other monitoring tools available, such as for safety barriers. The technical state of each installation and vessel is closely monitored through a management system that shows the real-time condition of the technical safety barriers. Every barrier is given a grade on their current status, to give the leaders responsible a good overview of the situation. This give them a good tool to help identify which systems are at any point the most critical for the safety so that they can easier priorities on improving the barriers that can create the greatest overall safety gains. Every month they have to write a short report on the situation at their installation in order to inform about their impression of the overall condition and how they are planning to obtain resources and improve any low grades found in their system.

5.1.1.2. Report System and the Culture of Reporting

Both sectors operate with a similar digital tool made to report errors, unfortunate events and near-misses that could have created dangerous situations. Employees at any level within the organisation can report an event. In both systems the report is sent showing the identity of the reporter. The reports logged in the system and sent to the leaders further up in the organisation that evaluates the incoming reports. If the events reported are of a certain severity degree there are done further investigations in form of a root cause analysis to identify the cause of the event, and what measures are needed to decrease the chances of the events to be recurring. Though, as one of the hospital leaders say "Error is a part of a human business. Parts of the business will be chaotic and random, and mistakes will happen no matter how you plan. But you can reduce the risk and reducing the likelihood of unfortunate events happening."

One of the main differences in the reporting protocols between the organisations is that in the offshore organisation all reports are required to be written in a "general manner"; meaning that no names should be reported and that they have to be written as descriptions of the situation using terms such as "operator1 and operator2". In the hospital this is not a requirement. Here there are no policies around the manner of writing a report. Though, the hospital leaders have the impression that the reporting culture in overall is quite anonymous, focusing mainly on the situation and the underlying causes.

The nurses interviewed express that they in most cases feel comfortable to report events, though only one of them feels that the system is anonymous enough. Her problem is mostly

that she does not have the time to report all incidents, and if she does not have the time to do it immediately it is easy to forget to do it later. The two other nurses also see the time-priority as one of the main issues, however, they do not agree that the system is anonymous enough. They have experienced situations where they or their colleges have reported mistakes of a named doctor, and then a copy of the message is then sent to the named persons mentioned in the report. Also when a nurse reports a different department's mistakes, the report is sent to the department with the reporter's name. Both of them mentions examples of cases where a doctor or an leader of an other department have contacted the nurse who reported and asked why she or he reported the event through the system when the problem could have been handled face to face. They believe that this is a reason why some their colleagues feels uncomfortable reporting certain issues. Two of the nurses also describes how there clearly is an underreporting when it comes to medicines within their departments. After they started to use a new tool for registering all medicines given to patients they have experienced a decline in reporting because of the time consuming process of the reporting. "There is a lot of underreporting in relation to medicines, and personally I do not report on this. This is just how it's become." In another department the nurse interviewed is very happy with the new system, and has no concern of any under reporting in her section. This difference in attitude is clarified by one of the hospital leaders as he explains that there have been issues with this system in the departments where there are high quantities of different drugs distributed to patients. Nevertheless, all the three nurses give the impression that they eagerly report most incidents that are related to time pressure or can be blamed on their work environment. One of the leaders also mentions this "issue" with the reporting culture; "It is evident that the reports are used by the nurses to point out resource shortages, or as a way complain that other departments does not do as their told." Though this can be seen as an exploitation of the system he also sees it as positive, because then the operative departments have a structured arena to inform the top management about structural issues.

The all over impression is that the reporting culture within the hospital is at a good and balanced level, and that important incidents are normally reported, though near-misses and events not leading to harm might not all ways be reported.

In the offshore organisation the reporting culture seems to be well developed and reporting incidents is a matter of course for the employees at all levels through out the organisation. Though, the offshore operators do indicate that admitting own mistakes can be uncomfortable "It is always a bit uncomfortable. It never feels good to think that you may have put others at

risk." The impression is that they have experienced similar exploitation with "over reporting" as the hospital is experiencing, but that there has been a cultural change in the resent years do to a focus on this issue. One of the operators confirm that she only reports if something could have gone wrong or did go wrong, and not issues that does not offer any learning benefits for the organisation. There has clearly been some underreporting in past within the offshore company too, and a few of the interviewees have heard about events that could have caused dangerous situations which still were not reported. The operators inform that there has been a "blaming" culture before, and that it used to be much harder to admit own mistakes and discuss safety related issues before. However, this have improved radically the last years as well and that the culture has become much more open and honest; "Because of a high focus from management that pointing fingers is not accepted we have become much more comfortable admitting our mistakes in order for the organisation to learn and avoid the same mistakes". Though, one of them does confirm that there are still people in the organisation that do give negative responds to mistakes, and that it can still be situations where people feel uncomfortable reporting. The culture has however become much better on their reporting and one of the offshore operators underlines another important argument for reporting: "People are willing to use of their time to report in to the system because the information they add is clearly utilised within the organisation through improvements and change." So the fact that the employees actually see that their reports are taken seriously by the management and that they lead to improvements is of great importance to promote reporting. All interviewees agree that they would report all events or near-misses that led to or could have led to an incident.

Finally, in both organisations the systems are intended to identify the root cause of reported events using systematic approach of analysing reported events. It is not meant as a tool to identify the responsible of the event or to "point fingers".

5.1.1.3. Learning and Measures

The way the organisations do use the reports for learning is through the root cause analyses. There are own employees within the organisations responsible for handling and evaluating the reports. Reports are categorised by the degree of severity, and for events of a high ranking safety concerns or with learning potential, a root cause analysis is performed and a report written. The information of relevance found during the examination goes out to frontend workers though an emailing system and through department meetings. If there are potential

for improvements or decreasing risk, measures are made, such as change in protocols or routines.

In the offshore company such reports are often studied and taken in to consideration when similar operations are to be prepared for. The operation leader will then bring the reports to the preparation meetings with the operators to see if they can learn from the mistakes made by others and identify measures to be done to lower the risk of them making related mistakes.

However it seems like there is a higher barrier for the hospital to make a change to improve safety regulations than it is for the offshore company. In the hospital one of the nurses expresses that to get a change an issue has to be reported several times. Measures are made though it can take some time to get a certain issue in focus. One example she gives is that there was one issue that had been reported many times over a period of time, eventually a patient died because of that safety issue, first then it became a great focus on the issue and the requirement was changed. On the other hand one of the offshore operators interviewed feels that there sometimes can be a too low barrier within the company to change the requirements. She feels like the company sometimes makes requirements that are hard to take in to consideration. One example she gives is when an employee reported that he had burned his tongue on hot coffee the company made a requirement that the temperature on the coffee machines should be lowered. She believes that such measures are made only to "satisfy the system. People drink coffee daily at home, and we should be able to look ourselves... the best is that they do not nag too much, as this can cause frustration and dangerous situations. We work more safely when we have to consider or own safety, in stead of when someone is nagging about our safety all the time". So there is a balance between too many and too few regulations to find the correct amount of safety measures.

Finally, it appears that the greatest challenge for both organisations with their reporting systems is not to make the employees report events and near-misses, but rather to draw the element of learning by experience out of the system. Both systems are complex and new reports are sent every day. The front-end workers are using the system only for reporting and not making use of the learning perspective of the system. Therefore, the way it is today, the responsibility to make the employees learn from each others mistakes lay on the leaders alone.

5.1.2.   Safety Training and Leadership Involvement

As explored in the literature chapter an advanced safety culture require individual awareness of the importance of safety, knowledge about risk and safety issues and competence to minimise risk and how to respond to unwanted situations. This is gained through training and instruction, as well as leadership commitment, motivation and supervision. To get an understanding of the organisational efforts in promoting safety it was of great interest to look at the modes of safety training as a particular marker of management involvement in safety within the units of analysis.

5.1.2.1. Safety Training

Everyone starting to work at the hospital has to go trough the "New Employee Training". This is a three days general course for all new permanent employees. Every employee is suppose to have this course before they start working in the hospital and receives their key card to the hospital and the computers. The course consists of classroom teaching, tours in the hospital, and e-learning courses that must be completed. The course is mostly about getting to know the hospital and the systems used in the hospital, and one of the nurses describes that the course include protocols for handling medicines, hygiene, fire routines, and evacuating. Additionally the new employees have a course more specified to the department they will be working in and their role. This course is locally adapted to teach the healthcare providers the routines and protocols of the department they will be working in. The nurses also have a period of eight weeks where they follow and observe an experienced nurse within their department, including going through a checklist of all the protocols and routines relevant for their work.

However, two of the three nurses interviewed had not completed the New Employee Training before starting their work in the hospital. One of them started working in the hospital 15 years ago and at that time the only training she received was to follow an experienced nurse for two weeks. The second nurse had started to work part-time in the hospital simultaneously as studying to become a nurse. As a part-time worker she did not get the New Employee Training, and when she started as a full-time employee she already had experience from working in the department. In addition she started her full-time position during a very busy time in the summer, so her training was postponed. First one year after she started as a full-time employee she received the New Employee Training. Nevertheless, both of the nurses

underlines that they have the perception that the hospital has changed their view on the importance of training. They believe that at the date of the interviews the hospital have a stricter policy on New Employee Training than before, and that now every new employee have to complete this course within a certain time of start working in the hospital.

When asked about any follow up training for the hospital staffs the interviewees informed that there are no systematic follow up training within risk management or patient safety. The only training that is formally repeated is a 20 minutes fire safety e-learning course that is to be completed once a year. Two of the nurses have also recently taken a course in patient privacy policy, though this was not a formal training around the whole hospital.

The offshore organisation clearly has a high focus on training all their employees at all levels through safety related programs and courses. Every employee visiting a building- or procurement site owned by the company is necessitated to have completed a basic safety course, this course also needs to be repeated every fourth year. They are also obligated to have a course in "Job Safety Analysis". As mentioned above; this is a risk assessment tool aimed to prevent harm to humans by identifying and controlling workplace hazards. There are furthermore several courses in different management systems, and every time an employee moves from one installation to another they have to go through "the learning on the job program" where they are trained locally at the installation before they are allowed to start working, to get to know the installation and the protocols specific for that site. Though every different position and role has its own training requirements, and there are specified training matrixes that have to be followed and documented through a management system. On of the operators interviewed, for instance describes that she needs to complete a range of e-learning courses on a yearly basis. They include protocols and routines that are not used that often, to always keep them fresh in mind. She finds them very useful and express that once a year is a good interval to have these courses.

However, there are some issues with the training programs within the offshore company as well. Accumulative demand of qualified operators and engineers can be a great challenge. Then it can be the easy way around to allow new operators to become operative too soon, without all the required training fulfilled. Also "the learning on the job program" where moved employees are trained locally at the new site might also be shorten down because the new staffs is needed in production. "You must follow the production plan; it's supposed to be followed even if there are new people coming in. However, they do not know the system at

the new installation well enough, and normally they are required to have some specific training before they becomes operational. But here the system fails a little, which then means that we get events."

5.1.3.   Safety Culture

To assess the general maturity of safety culture within the units of analysis it became relevant to hear their own perceptions of their organisation's safety culture, and how open and trusting the organisational members feel their organisations are. Additionally it was of interest to get an impression of resent changes within the culture to identify the directions the organisations were moving in regard to safety. Finally it was of interest what challenges the organisational member felt influenced their safety levels and how they expected to deal whit these.

5.1.3.1. The Perception of Safety Culture

The Hospital's Head of Quality underlines that there are many definitions and many words on this topic and that this applies a topic still not well studied and understood by the health sector. He defines that a good safety culture can be found in an organisation that manages to balance patient safety and health results with a healthy economy. "An established and successful safety culture will be able to make patient safety outcomes, economy and efficiency to act together. A safety culture fully depends on acting together with the other drivers in the healthcare service which are the patient outcomes, efficiency, and the economy."

He's perception of how the hospital's safety culture compares to his vision is that they are working determined towards this. They are on their way, though they will never become as good as their visions. "There will never be a time when we can lean back and say; now it is good enough." Healthcare is under constant change, and change requires adaption. If there is one thing that describes the healthcare service it is "change". He informs that the hospital has started recently started to do research on patient safety, and expect that this will help quite a lot in terms of their understanding of this area Patient safety is clearly one of the focus areas of the hospital, though as for the whole health sector in Norway it is still a development area.

The Division Director describes a good patient safety culture as having high competence and well structured routines that that are followed and controlled. He points out that to have a good safety culture an organisation will have to learn from its mistakes, and be able to adapt and change the way things are done.

When asked about the actual safety culture of his division he defines two categories: 1. In work environments where you perform reparative procedures and where it is possible to plan what to do and when to do things it is easy to keep high standards and a good quality, "it is easy to achieve good routines and have a high patient safety", 2. Though in other parts of an hospital this is not the case. There are departments in the hospital where seriously ill patients arrive in a hurry with injuries that requires procedures the medical personnel have not done for a long time and have not been able to plan for. It takes time to check how to do a procedure exactly off the book, "then we can not just stand there studying our routines into the night while the patient dies". So in work environments where it is impossible to prepare for what you will do next, it will also be much harder to keep a good safety culture. His impression is that the hospital is very good at some aspects of patient safety, though some aspects definitely have a potential for improvements. He concludes that the level of safety culture in the hospital is likely to be found around the average of the levels found in Norwegian hospitals.

The three nurses interviewed give the impression that they find defining a good safety culture challenging. The first nurse is focused on the creation of an open and learning culture with acceptance for human error "none of us are perfect; mistakes can help us learn to become better at what we do". She also includes the importance of following policies and procedures to the best interest of the patients. The second nurse embrace the procedure of double-checking every medicine given to patients, while the third nurse sees a good safety in the light having good patient information handling routines, a good privacy policy. They have three very different perceptions of what is significant for a good patient safety culture, though they all include important fragments of the full definition. A good patient safety culture as described by the nurses; an open culture where it is allowed to make mistakes and it is natural to admit them, a culture where it is expected to double-check each other, and were the organisation has the ability to learn from mistakes to become better, with personnel who follows good policies and procedures made to protect the patients.

The nurses express that they feel their departments have a good safety culture regarding openness and following protocols in general. However, they give the impression that healthcare providers in general are more focused on doing their job than considering potential risks and safety issues in their daily work. They also expresses that in pressured times; when their departments have more patients than their original capacity, they are pressured on prioritising their time. Then more mistakes are made and the patient safety decreases. It gets

harder to fulfil some protocols such as the privacy policy, double-checking each other, and to document the medicines given. They feel that in such pressured periods they do not have the time to complete the routines in the system that are designed to be "safety barriers"; made to ensure updated patient information at all times and safe delivery of medicines.

The perception of safety culture in the offshore company focuses on different aspects. Two of the operators interviewed from the offshore company describes a good safety culture as being drilled in the importance of understanding the task and always evaluate potential risks before executing. The leaders focus on compliance in their description. That decisions and protocols made by the top management team are followed as an obvious part of the employees' job at all levels through out the company. Every task is standardised leaving nothing up to individual assessment. They argue that to achieve this, the company needs well thought through protocols shaping the structure and describing "this is how we want it to be". Then the processes need to practiced and drilled until the protocols become the natural way of doing things.

When queried about the actual safety culture in the operational parts of the offshore organisation the interviewees' impressions is that the culture is varying from different groups internally in the company. It is argued that the culture of the offshore operators is very dependent on the attitudes of their leaders "when culture fails, it fails through the leaders". Some of the HSE leaders points out that this is a focus area within the organisation; to change the attitudes of leaders. They all seem to see leaders influence on the safety culture as very important. One knows that leaders have to set a good example "as when raising children, it does not help to tell them to do something if you are not doing it yourself". They give the impression that many and frequent changes in protocols and a wrong priority between production and safety have been a challenge for the safety culture within the company before. However, as it has been a major and clear focus on leadership and compliance within the organisation the last few years, they feel that there has been a great improvement in the attitudes around risk and safety. Today it is allowed and even supported from above to stop and think "Is this the way it should be, is this safe?"; the clear message is that safety always comes before production. Also the blaming-culture that has been seen in the company before has started to evaporate because of the strong focus from top management on not to "point fingers", making it easier to keep an open and honest culture. They all agree on the fact that the company has reached a much higher safety level and that there is a solid safety culture through out the organisation today. There are still things that can get better and information

that could be clearer. In a big organisation "it takes time to incorporate new practises and get the new culture to work in practice… it is a fight against reluctance, ingrained habits, bureaucracy and disloyal leaders", though they all feel that the company has come a long way and are still progressing on the matter.

5.1.3.2.   Cultural Changes within the Sectors

In the hospital there seems to have been a cultural improvement toward safety. Clearly there has been a change within the hospitals focus on the importance of training employees in safety. Form the interview with the nurse who has worked in the hospital for over fifteen years, there can be seen a great improvement in the new employee training personnel receive when they start as to work in the hospital today compared to the training she received when she started. There has also been a clear change in the way the hospital utilise innovation, and the last decade a range of more modern technologies and systems have been implemented with more or less success. However the nurse does not feel that there has been a major change in the patient safety during the fifteen years of her employment. One of the other nurses feels patient safety has decreased after certain system changes have been implemented, though in other departments the same changes has been found to increase the safety levels according to an other nurse. Though, the hospitals intention is always directed towards an increased safety. Also in the Norwegian healthcare sector there seems to have been a change. Before hospitals who reported many instances and unwanted events were accused for having a bad patient safety, though today hospitals are praised for having a good reporting culture and reporting many instances and near misses. One of the hospital leaders express that they have for many years discussed the need to get away from the "naming, shaming and blaming" culture, to direct the focus away from finding the culprit and the imposing responsibility on a person, "we know that is not very useful, it does not lead to improvement". Slowly the focus has changed towards understand the under-laying cause of human errors. He explains that errors can be caused by a instant of lack of resources there and then; that it was too much to do, or too many patients to handle, or it may be that the person did not receive the proper training and do not have the right skills or competence. Though he points out that; all licensed healthcare providers are obligated by law to inquiry advice if their own competence is not good enough. If they did not do this they can be charged by law for violating this duty. One is never blamed for asking for advice, though one can be penalised for not seeking information when one is unsure. So evidently there has been a slow cultural advancement, though as on of the leaders states "the way from knowledge through attitude changes to behavioural change

can be quite long." New system implementations, hygiene campaigns and better training of employees makes this evident, thought there is still a way to go.

In the Offshore company there has also been a radical change in the focus on safety. As one of the operators express the leaders seem to have changed their philosophy. Before the main focus was on production, and if a production site experienced an unwanted event that stopped production the focus was to get the site up and running again. Today the leaders seem to have seen the importance of safety, and they are supported if they choose to postpone production until the root cause of the event is identified and the risk is illuminated. The changes have evolved stepwise during the last decade. After some serious events took place in the industry in the beginning of the 21'Th century the industry started to get interested in the term "safety culture". More and more it became clear for the organisation that not only their systems had to bee good, but also to the culture among the organisational members had to work in practice. Then the focus came upon the importance of safety training and having an open culture where experiences are shared internally within the organisation. Finally during the last four years they have started to utilise a model of leadership and compliance and this have helped to increase their safety levels and advance their culture to the level it is today. The clear management focus on the leadership and compliancy model has made the organisational members understand that this is a focus that is of great importance for the organisation and that this is not going to change. As one of the operators describes it; "now this is what we are focusing on in the time to come, and I believe that people therefore understand that it is important and take it inn in completely different way". So through the clear focus on the importance of safety by management organisational members get affected and understand the importance of it themselves. There has also been an improvement in the focus on training; "We have realized that to become good at something you have to practice." Through training and practicing on procedures and how to do things the leaders believe that it will become the natural way of doing things, and eventually it will become the way people think; it will become a part of their safety culture. Still they are in the process of getting this work in practise, and there are a focus on utilising information about experiences and safety issues better. Though they have come a long way there are always room for improvements.

5.1.3.3. Organisational Challenges

When asked about the biggest challenge to ensure patient safety within the Hospital, both of the leaders interviewed answers that the hospitals capacity is pressured, in form of time, space,

competence and personnel. One of them argues that this is caused by the supply driven forces within the sector. So the demand is growing faster than the ability to deliver. "We have an aging population and an increasing ability to offer treatment that there really are not enough resources for." The resources and capacity is limited and it is therefore not possible to treat every patient. It is challenging to prioritise who to treat first and who has to wait until tomorrow though they ideally also should have been treated today. "Sometimes we have two or three times as many patient as normal, and then you do get a priority situation that can be challenging." It becomes a matter available time, available resources; in form of personnel and competences, and safety. They have to do the job just "good enough".

The quality manager also point out the issue of over-treating patients; that patients who do not really need treatment receives it because the treatments are available. "American literature estimates that about 30% of all diagnostic procedures or treatments are unnecessary". Here there is a significant potential for saving essential resources. And as an unnecessary operation is just as risky as a needed surgery, cutting down on avoidable treatments will also lower the chances of "waste" causing "harm".

The nurses concerns are supporting the view of the leaders. They see the capacity and time as the greatest challenges, and confirm that during pressured times at their departments the patient safety levels do decrease. There is not enough time to double-checking each other, to observe that patients take their medicines and stay to look for adverse events, or to report what medicines have been given out. "We have to strictly prioritise our time, and then we are not always able to follow procedures down to the smallest detail." The nurses are also focused on the rapid changes as an issue. One of them describes how she feels that there are constant changes, and that here and her colleagues then feel that the routine violations or deviations that happens because of sudden changes in routines and protocol are not really their fault, "We keep getting new tasks that we are not prepared for, and it is still required that we should know everything and keep the same quality on or work, and we cannot manage that". So they report their mistakes to make management understand that they cannot keep changing the modes of working and the tasks all the time, because "then we'll never get good in doing the job".

In the offshore company it is clearly not one obvious main challenge. The HSE leaders are also mentioning time as an issue, particularly within the installation building project. They have to follow a strict schedule and any delay to this schedule can cost enormous amounts of

money for the company. If a project is delayed because of an HSE issue all ships and drilling rigs rented for a particular time space in the schedule have to be postponed, and eventually the production will be deferred which will cost the company staggering amounts of money each day the production start is delayed. "Profitability of a project is very dependent on how fast the installation is ready to start production." Safety in such projects is very highly in focus, though the pressured situation can lead to misjudgements and "short-cuts".

Another challenge mentioned by the leaders with experience from offshore operations is that there is an accumulative demand of qualified operators and engineers. "As the number of wells to be drilled only this year compared to the previous year increases quite severely, the number of vessels and drilling rigs that we hire are increasing with it. They must have qualified people and it is a challenge to find enough qualified personnel to fulfil our demands." As mentioned above; the easy way around this challenge can be to allow new operators to become operative too soon, without all the required training fulfilled. Also when moving experienced employees around it is required to have local training at the new installation or vessel, and this might also be shorten down because the new personnel are needed in production.

Another thing that seems to be a challenge is to get the contractors to adapt to the safety culture of the company. The contractors account for the more than 80% of the hours work in the company, so then it is important that they also have a good cultural attitude in order to keep a safe environment within the offshore company. Many of the events that do happen within the company are related to contractors and not to the company's own employees. Clearly it is not enough that the offshore company's own employees share the same safety culture, they need to get it out to the suppliers as well. "So really, the whole supplier industry needs to adopt our culture, we are quite dependent on that. And we do push the supplier industry to get further, but they still lag a bit behind on the culture aspect." The leaders express that this is a challenging task, and that it would be easier if all the offshore companies had standardised systems and protocols. One of the operators working on a contractor vessel underlines that the personnel on long term contracts have a very good culture, as they learn the company's systems and protocols and are experienced in their job. Though, he also agrees that attitudes among contractors might not always be as good as wanted; "For short contracts with fixed prices it probably can be very varying conditions and the safety culture might not be as good as desired."

The operators also mention the governing documentation, protocols, as one of their biggest challenges, though seen from two different views. Two of them express that the protocols can sometimes be interpreted in different ways, that there are some overlapping protocols and that there are some ambiguities. However, they have seen great improvements on this matter during the resent years. The last operator comments that there are some protocols that are physically impossible to follow, current rules and protocols are not in accordance with her installation's standards. "When the platforms were built, there were many things that were not taken into account. They were for example meant to not need maintenance, which means that some of the equipment is not designed to be repaired. This makes some of the regulations physically impossible to perform." The operators also feel that the rapid changes in protocols and systems have been challenging. "We're maybe training on one thing and then suddenly there is a change in the systems so you have to deal with new things. So you constantly get new things without managing to be adept with a system before having to move on." However now there has become a clearer message about the way the company is moving and what should be in focus, so they all feel that their seeing an improvement regarding this issue.

5.1.4.   Discussion on Safety Culture and Regulations

Whilst the sections above are indented to dissect the responds from the interviews to describe the safety culture and safety measures within the units of analysis, this section compiles their main highlights. As explained in the Data Collection chapter, the data analysis strategy is relying on theoretical propositions (Yin 2003). The technique adopted for linking data to the propositions is pattern matching (Yin 2003), which in this case means finding indications that consistently appear in the interviews to synthesise the empirical evidences in the light of the research Proposition 1 and 2 given in the Research Design chapter.

Proposition 1 states that; "The offshore industry's safety culture is more advanced compared to safety culture found in the healthcare sector." In this respect, it will be of interest to concern Hudson's (2001) evolutionary model of safety culture. One should be careful when comparing two sectors of such a different nature and work environment, however there are clearly some differences and similarities that can be identified from the interviews.

Proposition 2 suggests that; "Leadership interest and involvement positively affects the safety culture and innovation adoption processes within the offshore and healthcare industries in Norway." In this section this proposition is seen in the light of safety culture. Here the overall

impression of managerial involvement in safety perceptions of safety in form of policy framework, training and visibility were considered.

It seems like both sectors have had a great improvement during the last decade when considering safety culture. It is clearly an increasing focus on the matter and both sectors have enhanced their modes of handling risk and safety. Both organisations have seemingly well functioning safety regulations and management frameworks determined by organisational policy. The offshore company though appears to have better management systems in place to monitor the safety situation. The hospital therefore seems more dependent on the organisational members informing on the safety situation in the different departments. Despite the leaders expression of continues controls of safety neither the nurses nor the offshore operators have experienced any impromptu inspections of how their safety culture is in regard to following protocols and regulations.

In both organisations the reporting tools and the reporting culture appear to be functioning at an adequate level. The hospital would possibly benefit from making it clearer for employees that reporting is not meant to blame individuals, though to point out issues of concern to allow learning. However, both organisations give the impression to have managed to minimise their blaming cultures which is a crucial step towards creating an open and trusting organisation. Though both organisations are still not good enough to utilise the information they gain from the reports. This is the point where the organisation builds trust. When employees feel that management hear them and understands their needs, then they can trust in the managerial decisions. The offshore company has seemingly reached a bit further on this matter and organisational members feel that the events they report does lead to changes and improvements, while in the hospital the nurses feel they have to report an issue many times before they get a satisfactory respond and change. Though, both organisations seem to be more on the reactive stage when comparing to Hudson's (2001) model. The offshore organisation appears to be responding with change more rapidly, though to create too many new protocols and safety measures may create confusion and frustration among the employees, and this needs to be balanced carefully.

Awareness of potential risks and safety measures among personnel is important for an organisation to accomplish to create an advanced safety culture. Knowledge and understanding of the importance of safety is accomplished through training, guidance and management involvement. Both the offshore operators and the nurses seem to have close

relationships to their closest leaders, though they do not feel too trusting when considering top management. In the hospital the nurses have little or none impression of the work top management do to accomplish organisational safety. They are trained when they start working in the hospital, thought there are no formal follow up training of employees. The training they have received has included only inconsequential focus on safety culture related information. The nurses seem to have individual perceptions of what a safety culture is and what is most important for creating good patient safety. The offshore operators have to some extent more understanding of the managerial focus on safety within the organisation. Additionally they follow yearly training programs in safety and are often reminded on the importance of "thinking safety". It does appear that the offshore company have managed to create awareness and focus among organisational members beyond the healthcare providers' natural sense of responsibility. There is evident that the offshore organisation through training and clear managerial focus has positively affected the way its employees consider safety. It cannot be claimed that the hospital has not accomplished the same, though form the interview findings the researcher does not identify sufficient data suggesting this. When considering restrictions to safety levels the interviewees from the hospital seem more focused on the limitations; the reasons why it is difficult to have a good safety culture, while the interviewees from the offshore sector seem more focused on what can be done to improve the safety culture.

Based on the information drawn from the empiric data it can be argued that the offshore company's safety culture is more advanced compared to safety culture found in the healthcare organisation, which support Proposition 1. However, the differences between the two organisations safety culture maturity does not appear to be as distinct as the literature suggested. Both organisations have seen a great evolvement in their safety cultures during the last decade, though they have a long way to go to reach the ideal generative culture of Hudson's (2001) model. Based on the data analysed in this research it can be suggested that the two organisations position themselves somewhere between a reactive and a calculative culture maturity. Though, the hospital can be argued to be closer to the reactive stage while the offshore company may be slightly closer to the calculative stage. In sum, the evidences are too weak to reach rigorous conclusions; therefore Proposition 1 cannot be proven true nor proven false based only on the existing research data.

It has become evident that leadership involvement does in fact affect the organisations safety perceptions and proposition two can be accepted. In the offshore organisation there has been a clear change in managerial focus from production towards safety. Additionally there has been

a change in the modes of safety training. Both of these factors have evidently affected the organisational members' way of considering safety. In the hospital the managerial influence becomes even more visible. By the lack of general safety cultures training one of the nurses is clearly affected by the focus area that has recently been introduced to her by management. The nurse, who has recently had a course in patient privacy policy, considers this factor as the main factor in her description of important factors of a good safety culture. The other nurses, who have not taken this course, focus on other areas and are not considered with the patient privacy policy in their description. <u>So leadership interest and involvement in safety assurance does affect the perceptions organisational members have on what is considered as important to ensure safety. Ultimately this will have the ability to positively affect the safety culture; therefore according to the empirical evidences Proposition 2 in regards to safety culture is supported.</u>

5.2.   Innovation Adoption in the Hospital and the Offshore Company

Innovation adoption is a complex and challenging process within an organisation. For organisational members to successfully adopt to new technology literature claims that management is required take many essential factors into consideration. To study the units of analysis' innovation adoption processes Rogers (1983) and Rogers and Shoemaker (1971) theories were utilised. Features of importance for successful adoption processes; compatibility, relative advantage and complexity were investigated, and the managerial efforts to enhance the five stages of the innovation adoption process (awareness, persuasion, decision, implementation, and confirmation) were assessed. The results were presented under the three titles; (1) Engagement in Innovation, (2) Factors of Successful Implementation, (3) Innovation's Effect on Safety, see Table 6.

Innovation Adoption
-    **Engagement in Innovation**
-    **Factors of Successful Implementation**
-    **Innovation's Effect on Safety**
Discussion of Proposition: 2, 3, 4 and 5

Table 6. Structure of Data Analysis for Innovation Adoption

At the end of this section the findings were deliberated based on Rogers (1983) and Rogers and Shoemaker (1971) theories and Proposition 2, 3 and 4, as defined in the Research Design chapter, were deliberated upon in the light of the empirical data collected.

5.2.1. Engagement in Innovation

For an innovation adoption process to be successful within an organisation the management and organisational members' engagement and enthusiasm in the new technology is of great importance. How innovation decisions were made, and what factors were involved in the making of such decisions within the units of analysis were important to assess. To understand the organisations' implementation process and whether management were engaged in this process to ensure that the adoption of a new system would succeed was also of great interest for this research. Finally, it was essential to study whether the organisational members were indeed positively affected by the managerial decisions and engagement, and what their attitudes were towards innovation and new technology.

5.2.1.1. Innovation Decisions

Decisions regarding implementation of new systems have up until recently been made by the local top management team in the hospital. Though, in recent times there has been a change in the regulations, so now all decisions regarding new systems to be implemented will be made by a regional health authority organisation.

Generally process innovation within the health sector has the goal to improve quality, give better logistics, cut cost and reduce the use time and resources. Though, as one of the hospital leaders express; "The aim is to save money from day one, while what we actually experience is that we have to use more resources. Without exception. I do not think I have been involved in introducing one system that has actually been resource-saving." He explains that the hospital has experienced to have to permanently cut their patient capacity in certain departments as a result of one of their latest new systems. A common problem with new systems for the health sector is that they get implemented before they are enough refined. Companies sells systems on the grounds that the hospital will save resources, and then they discover the many weaknesses and it turns out to be more work for the employees, so the hospital has to actively help further develop the system along with the producers.

In the offshore organisation major process innovations is an authority innovation decisions, meaning that the top management make the final decision regarding implementation. However, adjustments in governmental regulations are also involved here as increased requirements might result in a need to change.

The process innovations in the last decade within the offshore company have mainly been done with the intent to improve safety as a result of incidents. However, such alterations might be argued to be made with a cost-reduction motivation as the ultimate goal, as avoiding hazard situations will at a long-term perspective also reduce cost. Some process innovations have also been done to standardise systems to make all units use the same systems, and more technical innovations of more tangible tools have been done because of better functionalities, improvements in the product or that it is hard to get hold of replacement parts for old tools. Also here governmental requirements might have hanged demanding a "safer" tool among other things. When asked about particularly IT innovations one of the leaders express that "It is clearly that in previous IT-projects the actual costs have exceed estimates more often than for other innovations. Though, now we have become very conscious, maybe almost too critical, and phase out to stop such projects." He underlines that they have become much more cautious about the quality of technology before utilising it.

5.2.1.2. Implementation Processes

Both organisations seem to follow a similar pattern when introducing large process innovative systems. First the novelty is implemented in one section of the organisation, such as one offshore vessel/platform or one hospital department; the "first-user" testing, then if that is proved successful the innovation is tested on a grope of departments, the "multi-user" testing, before eventually, if the innovation has proved to be suitable and beneficial, the system is implemented through out the organisation. The chief of quality in the hospital underlines that the importance of this is so that is if the system does not work then the implementation process will be stopped. Additionally, in the offshore company there has become of great concern to conduct formal testing and qualifying of a new system be fore the implementing phase is even started. In this way faults and deficiencies can be identified before much exertion has been invested, and alternative solutions can be evaluated. Here also user-friendliness is taken in to consideration, because in order for a system to be well utilised it has to be user-friendly to the operators and in the environments it is to be used. This is in less focus within the hospital where it appears to be an issue with the pretesting of new systems

before the first-user implementation begins. This causes new systems to enter the implementing phase before they are enough refined. One of the nurses expresses that "The problem is that it is IT people who make the systems, and they have never worked in the clinic. So they make very fine systems in theory, though they do not work in practise and are not adjusted to fit our work environment." This might mean that there are too many weaknesses discovered during the implementing process that needs to be further developed and changed allowing only the major issues to be handled, and an imperfect system is eventually distributed around the whole organisation. When the implementation process has already started much money and resources have been invested in the system. This makes it harder to stop moving forward in the process and decline the system for a better alternative even though this might initially have been the plan. When asked about the implementation of the system in question the hospital division leader thinks that the process was generally well planned. Though, they had not taken into consideration the extent of additional time it would take to complete the daily work by using the new system. In the first months after implementations doctors had to work overtime and this was of course an extra cost the hospital had not expected. Additionally he expressed that "if the system had been more thoroughly tested and all the beginner faults illuminated before implementation, the process would have been considerably better." This was confirmed by one of the nurses who felt that the system was indeed implemented before it was good enough, leading to negative attitudes among the organisational members.

For the implementation of process innovations in the offshore company there is one designated person at every site responsible for the implementation process. That person follows up the progression of adoption and delegates the roles of being prime movers to some operators within each department. They are thoroughly drilled in the system and are to advocate the new system to the rest of the organisational members. This is an approach the hospital also has started to utilise during their resent implementations. This is a good way to assure that there are always resource persons available, and decrease the chances of negative attitudes to arise when challenges are faced within the departments.

Finally, the maybe most important part of the implementation process is the training of organisational members. For the two systems focused upon in the units of analysis the training of organisational members seem considerable similar within the two organisations. Both have arranged three days courses of training and practise for their employees in how to use the new systems. As seen in Rogers' (1983) five step innovation adoption process, it is essential that

organisational members are well trained and have a good understanding of the new technology to accept the new system. One of the offshore operators confirms this; "The problem with all new systems that are implemented is that people need the time to get to know them, they need the competence to use it." In the offshore company it was additionally mentioned that during the training there was greatly focused upon the risk and safety related issues and why the system was needed. This made the users understand the importance and value of the system to increase their acceptance of the new tool. The information and training employees receive within the offshore company seem to be sufficient in doing this, and the offshore operators give the impression that they feel confident in the use of new systems after the courses they are offered. However they indicate that information about minor system changes could have been better, and that they often do not receive information about such changes before they are receiving the actual training. The nurses do also have the impression that the training they received was good, though focusing mainly on how and when to use the system. One of the nurses comments on this, she whish that there had been more information about why they were to utilise the new system. She felt that it was a decision pushed upon them with out information about the reason why or what added value it could offer. She claims that this could have helped the healthcare providers accept the change. One of the other nurses comments that the courses were completed too long before the system actually was implemented, which made it hard to recall how the system worked. The nurses give very contradicting descriptions of the implementation process and functionalities of the system upon questioning. Two of them found the implementation process to be very challenging and still find the system difficult to use and not very effective. They are missing certain features within the system, and feel that they have lost the overview after they started to use the new system. Neither of them feels that the system has become well integrated in their work environment, and that the system is still an issue of concern regarding patient safety. The third nurse is located in the department that was the first-user implementation group. This department was offered extra support during implementation process, with additional training and guidance, as explained by the quality manager. This nurse has a very different impression of the system. She express that it indeed has all the features that the other nurses are missing and that using the new system has given here a better overview of the situation. This might indicate that the training of the multi-user departments has maybe not been sufficient, and that it would have been beneficial for the organisation to give all the departments the extra support that the firs-user departments received. However, as the division leader explained, the implementation process was planned in a manner that the departments who were considered

to face the least challenges with the new system, based on their local environment, were to be the first-users. "… and despite some minor issues the implementation was very successful here. Later on in the process, though, when the departments that were assumed to face more complications during implementation started to use the system, it became very challenging. We had to permanently reduce the patient capacity in some of those departments."

5.2.1.3. Employee attitudes

The offshore operators give the impression to be affected by whether the new system after their perception offers a relative advantage or not. They seem more enthusiastic about tangible innovations in form of new tools than what they seem for process innovations. One of them mentions a process innovation she felt was "something already existing with a new name". However the new system was implemented after an unwanted event had happened and therefore she supported the implementation. When mentioning another process innovation, where she saw an obvious need for the new system, she seemed much more enthusiastic. The offshore operators express that there are a lot of change in their organisation. This has made them use to change, and expecting to have to learn new systems, so they are never surprised by the innovations. Though, they do that there can be too rapid changes, and that at the point when they feel confident and good at utilising one system a new one comes along to replace it. However, when the operators were asked about the particular process innovation in question some of them admit that they were very sceptical to the new system in the beginning. They explain that this was because of previous negative experience with similar systems. "We were sceptical before we got to see it and test it for our selves.", but the attitude changed once they saw the value and at this time they are very positive to the system. "This time I believe we have succeeded", though, they do still see potential for improvements in the system, but it is under continues improvement; "As it is with all new systems". They give an impression that they consistently use the systems provided as required, even though some requirements might causes a short job to take considerable more time or even be delayed. One of the leaders express that in general the company is very excited about new technology, to increase competitive advantages, increase revenue, solve issues, increase safety levels, and get better results all over. He claims that the company is one of the market leaders within this field, and that they are good at inspiring others. They invests a lot in research in to new technology; "We are proud to develop and utilise new technology in this company".

When considering the system implemented in the hospital the chief of quality admit that "Clearly the system was not good enough IT-technically to be greeted by the organisational members at the time it was implemented." Though, he express that the pilot department that received extra support during the implementation process quickly got very enthusiastic about it and gave the impression that this was something they wanted to continue with. This is supported by the nurse interviewed from this department. She in general seems to be more enthusiastic about new technology, compared to the other two nurses who had a worse experience with the implementation of the new system. This can be because of the previous positive experience of the first nurse, though it has to be taken in to consideration that she is a bit younger than the others as well as she had worked at the hospital considerably shorter before the new system was implemented. The department leader claims that healthcare providers in general is not very interested or engaged in new technology before it actually gets implemented. They are mostly engaged in their existing work environment and have little time or interest of being involved in discussions years up front. "It is first the day they meet the new system in their department they get engaged in whether it is good or bad." He feels they are neutral to innovation, and not very enthusiastic in any direction. However, he express that parts of management and employees have become sceptical about system innovations, caused by bad experiences, that few new systems actually can offer the resource saving promised.

5.2.2. Factors of Successful Implementation

All the interviewees were asked about what factors they believe are important in order for the organisational members to adopt an innovation. The offshore leaders enlighten the importance of the quality of the innovation; that the system needs to be thoroughly tested and qualified before it gets implemented to make sure that it function as expected by the employees, to not create a negative attitude for the innovation and loose the trust of organisational members regarding future new systems. One of the HMS leaders express the importance of a positive and clear message from the leaders to advocate the benefits and value of the novelty, "that users feel that they get something back from all the time and effort they put in to learning to use a new tool". When organisational members recognise the benefits with a new system it creates a positive attitude towards the system among them and they do actually want to utilise it. If one group of employees starts to express negativity about a tool this spreads very fast and is a great hinder during the adoption process. The offshore operators confirm what is

expressed by their leaders when a safety process innovation is discussed; "when we see the value of the system, that it actually do what it was promised to do, to increase the safety levels, then we will actually also use the underlying systems; the maintenance and management systems, and report safety issues in a good manner." So implementing one good system that increases the focus on the importance of safety might actually be motivational for the operators to utilise other safety systems better as well. So clearly it is an important factor that they see the value and need for the new tool. They also express the importance of positive leaders and good training and information; that they get the time to really understand the new system and to feel confident in using it when you are to start to use it in their job. Finally one of the operators adds that; "to increase safety levels is of course motivating for all of us", so systems that make their job easier and safer are great motivators to positively affect the innovation adoption process.

The hospital leaders agree in that the quality of the new tool is a fundamental requirement for organisational members to adopt it in a good way. That the system is considered as good and offers added value so that the users think "aha, this was smart". They have also a focus on the importance of trust; that the employees feel assured that management has thoroughly thought through the risks of implementing a new system. That there is an implementation strategy that does not lead to increased risk and safety issues. Though one of them does admit that; "we have seen time after time that there is great risk involved in implementing new IT-systems". This has led to bad experiences among organisational members, and decreased internal trust. "If you see a new system and feel that you, and not the system, is the expert than that will negatively affect your attitudes towards this system as well as towards future new systems". So if a user experience obvious faults or defects once they are presented to a system, this will lead to bad impression and will not be beneficial for the innovation adoption process of the organisation. Then in the meeting with innovations later on in the organisation the users' expectations are reduced, and this can affect these adoption processes as well. One of the hospital leaders add that standardisation of IT-systems within the Norwegian healthcare sector could be beneficial, however almost all systems differ from hospital to hospital and even internally between hospital departments. This is an issue that has been found in the offshore industry also, though there has during the last years been an increased standardisation and improvement in this field.

The nurses see the most important factors of successful adoption to be how user-friendly the system is and that they receive good training and information of how to use it. The user-

friendliness is very important to them, as no matter how good the system is, or how many added values it gives it do not help if they do not manage to use it in the right manner. They are also very focused upon the extra time required to use a new system. It seems important to them that systems should not bee too time consuming to utilise as this will lead to decreased use. As time is already pressured in their work environment systems that require extra time is not very appreciated. Regarding the training one of the nurses points out how essential it is that personnel are trained by individuals who are enthusiastic and positive towards the new system. The trainers also need to be very good at utilising the system so that they do not experience challenges that cannot be solved during training. These two factors increase the positivity among employees she claims. She also mention how easily negative attitudes spread among organisational members. She has experienced that negative attitudes from the departments that are not pleased with a new system affect the attitudes of departments who still does not use that system, and make them not want to have the system implemented in their department at all. Therefore, clearly to keep organisational members positive to a new system is an essential factor for a successful organisational innovation adoption process.

5.2.3. Innovations' Effect on Safety

In the hospital innovation tends to have an initial negative effect on safety. Both the leaders and the nurses seem to agree on this point. "Most new systems give a quality rise in the long term, though rarely at once" one of the hospital leaders claims. It is not clear if the new system in question has had any effect on the safety of the hospital, "Strictly speaking there are no ways to measure an increased safety, though the conjecture is that it does contribute". Though, it becomes clear that the initially wanted results inform of resource savings and better logistics after the implementation have not been encountered for. Regarding the safety benefits one of the leaders state; "In the beginning the implementation pressured recourses that affected the safety negatively, now the safety should be back where it was, maybe even better, at some points". The nurses give different impressions in whether the safety level has been affected. Two of them have a negative impression about the new system; they both come from departments that were expected to experience difficulties when this system was implemented. Neither of them feels that the system has become well integrated in their work, and that the system is still an issue of concern regarding patient safety. The third nurse, however, claims that her department has benefited by the system and that it has increased the patient safety there. The other leader express that; "In the balance of how it affect our safety

we need to consider the complexity of the system and the healthcare providers' ability to utilise the new tool in a safe manner, so there are always a chance of a downside. But we do not have any clear answer to whether it has affected our safety." Based on the information from the nurses, however, it can be assumed that in some departments the system has in fact had a positive effect on the patient safety. Though, in other departments the negative consequences of the new system might ultimately have decreased the safety. They all seem to agree that it was a system change that had to happen at some point. Though, the leaders argue that it cost to be early adopters. "The smart ones wait and let others do the implementation and the experiences, so that the system is improved before one self make use of it, so you avoid all the beginners mistakes." There were clearly risks involved with the previous system, though new risks have evolved trough pressuring resources in some parts of the hospital. At this time the hospital is using three different systems for the same job in different divisions. This lack of standardising, as well as neither the improved logistic nor the saving of resources may have caused the implementation of the new system to bring more challenges than benefits. As one of the leaders confirm; when innovative systems are evaluated only the benefits are considered; "The risk and that every new system needs further development and that one use more resources in a period of transition are not accounted for." So when they chose the system, they had not really gasped the ultimate consequences of the implementation.

In the offshore company there has mainly been positive experience with process innovations. The leaders believe there has been a great safety benefit by implementing the system in question. The organizational members in general agrees in this statement, and express that though the day to day safety of their operations has not been very affected, the overall safety situation at the production sites has been improved. One of the offshore workers, however, does not have the impression that the new systems she has seen be implemented have had any significant improvement on the safety level. Though, it has not caused any deterioration in the safety level either. It seems that because of the required and detailed testing and good training of employees the offshore company does not experience the initial decline in safety when they implement new innovations. The operators are qualified in utilising the new tools and the tools have been tested and modified to remove enough of the beginner faults before they are implemented to ensure stable safety levels also during implementation of innovation.

5.2.4.   Discussion on Innovation Adoption

The sections above are indented to present the responds from the interviews to describe the innovation adoption process, factors of a successful implementation and how innovations are affecting safety within the units of analysis. This section, like the discussion section for Safety Culture and Regulations, compiles the main highlights that appear in the interviews and synthesise the empirical evidences in the light of the research propositions 2, 3 and 4 given in the Research Design chapter.

Proposition 2 suggests that; "Leadership interest and involvement positively affects the safety culture and innovation adoption processes within the offshore and healthcare industries in Norway." Under the Safety Culture and Regulations discussion this proposition was found to be supported in regards to leadership involvement's affect on safety culture. In this section this proposition is seen in the light of innovation adoption processes. Here the overall impression of managerial involvement in the implementation of innovation in form of planning, training and visibility were considered. Here it was of interest to take into considerations the organisations' success in leading their organisational members through the innovation adoption process by Rogers (1983) as elaborated in the Literature Review chapter.

From the empirical data both of the organisations' members have corresponding impressions of what are important factors to accomplish a successful innovation adoption process. The factors that are focused upon are; high quality of the new system, that it is user-friendly and that employees clearly see the added values of the new system; sufficient training and information about the system, to allow employees to feel confident in operating the new system and that a positive attitude is created among employees; and a good and safe implementation strategy, that does not cause increased risk and safety issues. All these factors are directly associated to management involvement in the innovation adoption process. Management is responsible for adequate testing before implementation of a new system to assure of quality and stable safety levels during implementation. They are the source to information and are responsible to make organisational members trust in their decision to create a positive attitude among the organisational members. Additionally they decide on how and what training employees are to receive and that the implementation process is completed in a good and safe mode.

Based on these findings it can be implied that also for innovation adoption processes leadership interest and involvement is of great importance. Managerial engagement in the adoption process does appear to be very essential to an innovation implementation, and does positively affect organisational members' adoption process. By this empirical evidence proposition 2 is proven true in the unit of analysis.

In proposition 3 it is assumed that; "It is a more positive environment for innovation adoption in the offshore industry than what is found in the healthcare sector." To study this proposition the empirical data was analysed based on Rogers and Shoemaker's (1971) three features important for successful adoption; compatibility, relative advantage and complexity, as defined in the Literature Review chapter.

The hospital has had some previous experience with implementing systems that were not well enough adapted to the work environments where they were to be utilised, causing personnel to face compatibility issues such as initial bad attitudes towards innovation because of previous negative experience with new systems, and that they are assuming that a new system will not cover the needs of their work environment. They also seem to feel considered about relative advantage, as they have experienced that new systems might have offered some new features, though have not offered all the benefits of previous systems. The complexity is also considered as a greater issue within the hospital when compared to the offshore company. In the offshore company operators express that they are used to applying new systems and technology, this gives them a familiarity of how to understand and utilise new systems. The hospital, however, appears to not have implemented sufficient numbers of systems for the staffs to feel comfortable in their use of new technology. Additionally, as it was enlighten in the empirical data collected from the offshore organisation, the oil and gas industry mainly consist of individuals with technological training and understanding. An individual who holds technological educations tends to have a personal interest in technology and therefore can be assumed to have an initial positive attitude when confronted with new technologies. The healthcare providers does not benefit from this technological background and can therefore be assumed to have a certain degree of resistance when having to learn new complex system innovations.

Based on this data it can be argued that it is a more positive environment for innovation adoption in the offshore industry in comparison with the healthcare sector. Proposition 3 is therefore supported in the light of the environments identified within the units of analysis.

Finally the proposition 4 propose that; "Innovation increases the safety levels in the offshore and healthcare sector." As it was argued in literature innovation is essential for organisational advancement. System innovations are claimed to have been a major factor positively affecting the safety levels within the offshore industry, and it was therefore assumed that innovation does in fact have an positive affect on safety in the to units of analysis. To assess this organisational members and leaders impression of increased safety after implementation of process innovations was considered, though no numerical evidences was collected to defend this proposition.

The two organisations demonstrate some differences in their managerial involvement towards reaching a successful innovation adoption process. In the offshore company there is a greater focus on pretesting of new system to ensure high quality before implementation is started. The employees have not experienced a decreased safety during implementation, suggesting that the quality of the new systems implemented and the training and information they have received has been sufficient. Though, there are certain differences in the perceptions of whether and how much safety levels are in fact increased after innovative systems are utilised. Generally they have an impression that safety levels are positively affected by the process innovations, as illustrated in Figure 5.
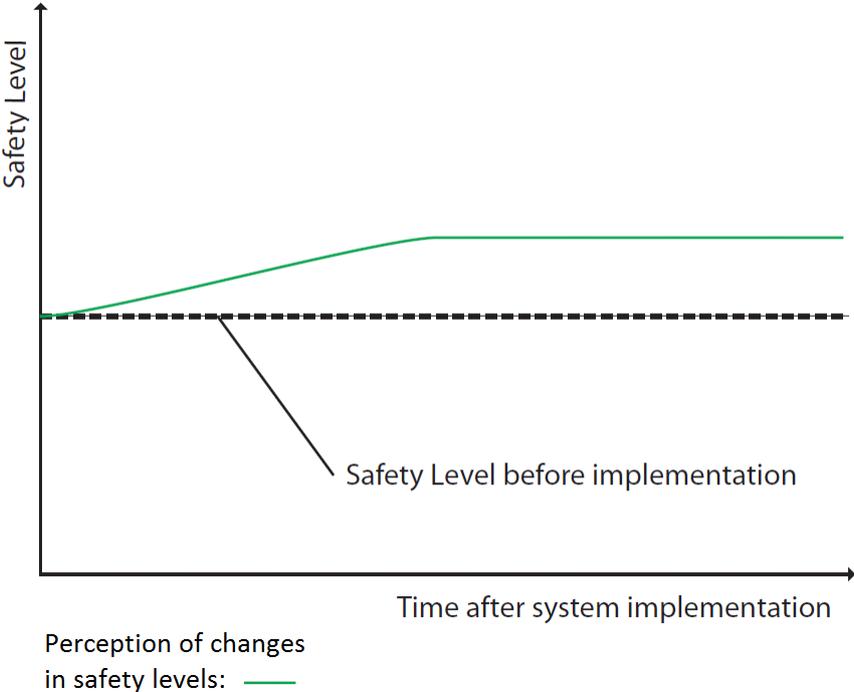

Figure 5. Illustration of the interviewees from the offshore company's general perception of process innovations' effect on safety levels.

In the healthcare organisation, however, all interviewees confirm an initial drop in safety levels after the implementation of a new system. The perceptions among organisational members of the evolving of safety levels after this decline is though very separated. Some members indicate that safety levels stay at a lower level than prior to the implementation, others feel they go back to the safety level before implementation of the new system, while some claim that the safety levels are ultimately increased. This is illustrated in Figure 6.
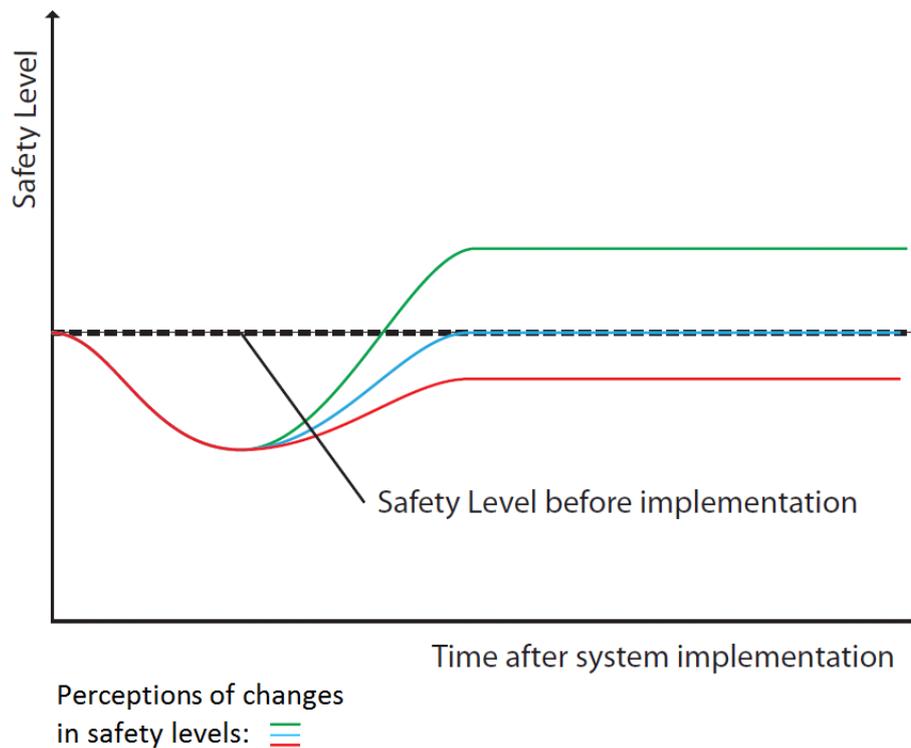

Figure 6. Illustration of the interviewees from the hospital's different perceptions of process innovations' effect on safety levels.

Based on the empirical data collected in this research alone it cannot be suggested that innovation does advance safety levels within the offshore and healthcare organisations studied, so Proposition 4 is not truly supported. However, the researcher does suggest that the effect of process innovation has the ability to positively affect safety levels. Though, this is strongly dependent on a well qualified new system being successfully adopted by organisational members through a systematic and good implementation process.

6. Conclusions

In this final chapter proposition findings and additional findings leading to potential managerial implications were presented in short. At the very end of this academic work and finally the research question of this study were reflected upon, and safety culture was compared and linked to innovation adoption processes.

6.1. Findings and Managerial Implications

In the sections presented above the empirical findings were discussed in the light of the propositions proposed in the Research Design chapter. It was found that the offshore organisation did not have a clearly better and more advanced safety culture compared to the healthcare organisation studied. Leadership interest and involvement were identified to be of great importance when considering the safety culture and innovation adoption process within the units of analysis. Additionally, it was found that there is a more positive environment towards innovation adoption processes within the offshore organisation in comparison with the healthcare organisation. Finally, innovation could not be proved to increase the safety levels in neither of the organisations, though the empirical data suggested that with a successful adaptation process innovation could be claimed to improve safety levels.

Some additional findings of interest have been identified throughout this exploratory case study;

Firstly, in the hospital analysed it appears that some personnel do feel concerned by the lack of anonymity in the reporting tool used for reporting unwanted events and near-misses. However, as confirmed by the leaders this tool is not meant for the reporting of individuals by name. The tool is intended to identify the root cause of the reported events for the organisation to learn and advance its safety measures. Therefore, the hospital as a learning organisation would possibly benefit from making it clearer for employees that reporting is not meant to blame individuals, though to point out issues of concern to allow learning.

Secondly, an interesting observation was made when studying the system innovation implementation process in the hospital. The leaders claim that the implementation process was to be stopped if the system did not offer the benefits that were promised. However, the implementation process was planned in a manner that the departments who were considered

to face the least challenges with the new system, based on their local environment, were to be the first-users. This strategy can be questioned, as they then first will identify the major issues with a new system fare out in the implementation process. At that point the amount of invested recourses will be so considerable that stopping the process will be a costly and difficult choice to make. Therefore it would be suggested that for future process innovations this strategy is reconsidered. The researcher suggests that it could be beneficial if the departments expected to experience the greatest challenges with a new process innovation were included in the first-user group. In this way weaknesses and faults with the new system could be identified at an earlier stage of the implementation process, and it would be easier to consider alternative solutions.

A third observation is that personnel in neither of the organisations are much engaged in the planning and decisions on new process innovations. It is the management responsibility to inform and involve employees in their innovation discussions in order to deliver innovations that are actually needed. Both organisations could potentially benefit from investigating the needs of their employees, both in the process of identifying requests of beneficial areas to consider new and innovative processes, as well as in the process of pretesting new systems to ensure user-friendliness and work environmental adaptations of new process innovations. This could potentially have a great effect on the innovation adoption process and the attitudes among employees in regards to new technology.

Finally, linking to the third observation, several of the interviewees conversed with for this research had interesting thought regarding process innovations intended for healthcare organisations. From the offshore organisation it was suggested that the hospital could benefit from an IT-system that allowed every organisational member to access the real-time safety and quality situation within each department and on all medical equipment located within a hospital. A tool that offered to illustrate progression or decline in safety levels, visualise the causes of such changes and identify the measures that would give the greatest safety benefits and should receive the first priority. From the hospital a similar IT-system was suggested. Here the need of a system that could visualise the real-time patient flow in all departments within a hospital was expressed. This was assumed to offer benefits at times when a hospital has increased numbers of patients, reaching towards its capacity, and when resources are pressured. In such situations the suggested tool would visualise where there still is capacity receive more patients within a hospital to, and immediately identify the patients that needs to be transferred to another facility. The researcher envisages an IT-system that combines these

two tools in one tool that offers an overview of the real-time situation in a healthcare organisation. Although this is not directly a managerial implementation, it might propose to conduct more investigation of the need of such a system, and possibly to a request for a tool to be developed.

6.2. Final Conclusion

In this final conclusion of the findings the main research question was examined; "How does the cultural attitude towards risk and safety in the Norwegian offshore industry and healthcare sector affect their innovation adoption processes?" When answering this question the first inquiry to clarify was whether an organisations' safety culture do indeed affect the innovation adoption process among its organisational members. Innovation adoption is claimed by Rogers (1983) to be a process of five stages; awareness, persuasion, decision, implementation, and confirmation, all defined in the literature chapter. These stages can in many ways be argued to describe the way individuals also adapt to safety measures; which in the end becomes an organisation's safety culture. Individuals first get aware of the safety issue, then receive information and training to minimise the risk of an unwanted event to happen. Following this they make up their personal opinion on whether they should be concerned about the safety issue, and how to behave to handle or ignore the issue. When they have seen the consequences of their behaviour they choose whether to continue their behaviour or whether to change their modes of action. Therefore, the same stages of action as the ones assuring a successful innovation adoption process will be required by an organisation in order to advance their safety culture; make the organisational members aware of the safety situation, inform and train the individuals towards understanding and handling the risks. If this training is sufficient and people feel the behaviour suggested by management is in fact increasing safety they accept the measures and the organisational safety culture can advance. This suggests that an organisation that is good at advancing safety culture will also feature the capabilities to accomplish successful innovation adoption processes.

Additionally, there are clearly many of the same factors needed to advance a safety culture as the ones needed to thrive in accomplishing a successful innovation adoption by an organisation. Major organisational features that are found to be important for both an advanced safety culture and a successful innovation adaptation process are; informed organisational members who have, through training and managerial supervision, understood the importance and added value of the innovation/the increased safety; and organisational

trust and openness, where employees trust in managerial decisions, and where management is interested in understanding the needs of their employees and listen to feedback from their employees to increase the benefit of new systems. It could therefore be suggested that an organisation that has achieved an advanced safety culture maturity will have the right attitudes among their organisational members to have an advantage in the meeting with new technology. The openness, trust, and confidence in managerial decisions, which an ideal organisational safety culture has, will ultimately offer a greater chance of accomplishing a successful innovation adaptation process. However, this does not mean that adoption process will go effortlessly. Clearly every innovation implemented needs a well thought through testing, informing, training and implementation process, though the advantage of having organisational members who believe the management makes the right decisions, take responsibility and listen, is of course an advantage. To conclude, the safety culture in it self might not be the important factor of successful innovation adoption process, it is the features of the safety culture that can positively affect an organisational innovation adoption process through out all the steps of the process.

Before this study was commenced some ethical considerations arose from the fact that the topics in focus; safety culture and acceptance of innovation, are psychologically difficult topics to discuss. Throughout the data collection process the researcher sensed that some interviewees gave the impression to not include all difficult details. It is impossible for the researcher to determine whether such concealments have indeed occurred, though this needs to be taken into consideration when assessing the data. The data that may have suffered from this suppression of information are particularly the evidence considered in Proposition 1 and 4. Neither of the two propositions was therefore concluded upon and further research and empirical data is required to conclude on the safety levels within the two industries in Norway as well as how innovation affects their safety levels. It has to be declared that the only way to fully understand an organisation is to be part of it. As an external observer a researcher can never to a full extent gasp its nature, though through interacting with individuals who are part of the organisational culture the observer can achieve a partially comprehension of its character.

Finally, this exploratory case study research only took into consideration two units of analysis and was basing its conclusions on the opinions of only thirteen interview objects. It is therefore of great importance to beware the difference between their internal and external validity (Yin 2003, Wilson 2010). Since this study has been performed in two single cases,

only including a marginal number of their organizational members, the results cannot, exclusive of further supportive research, be generalised to anticipate attitudes and behaviour within the two units of analysis, nor within other organisations and industries. In other words, the conclusions are backed by empirical evidences that offer only validity within the boundaries of the informants questioned for this research. Therefore no normative conclusion can be drawn from this study about the relationship between safety culture and innovation adoption in general. Nevertheless this study contributes with initial empirical evidences and case-specific conclusions that suggest the existence of a relation between the two phenomena that may propose to further research on this topic.

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APPENDIX – INTERVIEW BACKBONE

Interviews with organisational leaders:

Safety culture questions:

- Can you tell me about your background and what your role is in this organisation?
- How would you define an ideal safety culture?
- How would you compare the safety culture you described with the safety culture you have in this organisation?
- How do you ensure safety in this organisation?
  - Are there leaders with particular responsibility to ensure safety?
  - Is there external parties controlling your safety?
- What training and supervision do organisational members receive in regards to risk and safety?
  - What are the goals of this training?
  - How often is it repeated?
- Do you think it is easy for organisational members to talk about safety related topics and own mistakes with their leaders?
- Do you have a system for report incidents or accidents?
  - How does the reporting system work?
  - What types of events are to be reported?
  - How do employees feel about and utilise the system?
- If an employee sees a potential threat to the safety, how would they, and would they communicate this to the management?
- Would there be different consequences for an employee who reported his/her own mistakes compared to if someone else reported the mistakes?
- Are there any standard operating procedures when an accident happens?
  - What are they or how do they work in such situations?
  - What measures are done to assure that the situation will not happen again?
- Have you experience situations where there is a conflict between prioritising safety and other important goals?

- What do you consider to be the greatest challenges for this organisation to achieve high levels of safety?

Innovation adoption questions:

- Did you work here when the system in question was implemented?
  - How long did you work here before the implementation of the new technology?
- Who made the decision that this system was to be implemented?
- Why do you think this new system was implemented?
- Do you believe that employees understood the need and the value of the new system?
- How did you feel about the implementation process?
- Has the system been well integrated in the daily process in the organisation?
- What feedback have you received from organisational members about the system?
  - What are the strengths and weaknesses with the new system?
- How did management assure that personnel saw the value of the new tool?
- Do you believe things could have been done differently during the implementation in order for the organisational members to have a better attitude towards the new system?
- Do you feel this system has improved the level of safety?
- Which factor do you consider important for creating a positive attitude among organisational member towards a new system or tool?
- Do you have any additional comments?

Interviews with organisational employees:

Safety culture questions:

- Can you tell me about your background and what your role is in this organisation?
- How would you define an ideal safety culture?
- How would you compare the safety culture you described with the safety culture you have in this organisation?
- How do you ensure safety in your daily work?
- How would you characterise the hospital management commitment and engagement in safety?

- Do you feel that safety rules and procedures in some situations become barrier for you to doing your job efficiently?
- How is safety controlled her in your department?
- When was the last time you had safety training, or were reminded about safety issues by your manager/supervisor?
    - Did you have risk and safety training when you first started your job? If not, why do you think that is and do you think it could be important? If yes, what kind of training?
    - How are your safety skills gained from the training maintained?
- Do you think it is easy to talk about safety concerns and issues with your leader?
- Do you know if you have a system to report incidents or accidents?
    - How does the reporting system work?
    - What kind of event do you report?
    - When was the last time that you reported an issue, what was this about?
    - Do you feel the reporting system works?
    - Do you think everyone use it actively?
    - Do you think some issues are hard to admit for some employees?
    - Do you think that all your co-workers understand the importance of safety and reporting safety issues?
- Have you noticed any improvements after you or others reported an issue?
- If an employee sees a potential threat to the safety, how would they communicate this to the management?
- Have you experienced any accidents or near-misses?
- Are there any standard operating procedures when an accident happens? What are they or how do they work in such situations?
- Have you seen changes after an accident or near-miss situation to prevent it from happening again?
- Have you experience situations where there is a conflict between prioritising safety and other important goals?
- What do you consider to be the greatest challenges for this organisation to achieve high levels of safety?

Innovation adoption questions:

- Did you work here when the system in question was implemented?
    - How long did you work here before the implementation of the new technology?
- Who made the decision that this system was to be implemented?
- Why do you think this new system was implemented?
- How did you feel about the implementation process?
- Has the system been well integrated in your daily work?
- Do you feel comfortable with the system?
- What do you like/dislike about it?
- Do you think your colleagues find the new system beneficial and user-friendly?
- How were you trained in the use of the system?
- Were the benefits of the new system clear for you before you started to use it?
    - Do you still think it offered benefits?
- Do you believe things could have been done differently during the implementation in order for you and your co-workers to understand and use the system more efficiently?
- Do you feel this system has improved the level of safety?
- Which factor do you consider important for creating a positive attitude among organisational member towards a new system or tool?
- Do you have any additional comments?