

REGULATING THE INTANGIBLE. SEARCHING FOR SAFETY CULTURE IN THE NORWEGIAN PETROLEUM INDUSTRY

Abstract: The way organizational culture can influence safety has been a topic in safety research and accident investigations for decades. This has led to an increasing interest from regulators to include the concept of safety culture into the sphere of risk regulation. In the Norwegian petroleum regulations, a requirement for a "sound health, safety and environment culture" was introduced in 2002. The article presents a qualitative study of the perceived effects of this requirement on safety, seen from the perspective of both the regulator and the regulated companies.

The study shows that introducing the concept of safety culture into regulation can have positive effects both within the regulated companies and within the regulator's own organization. While certainly not being suited for a "command and control" approach to regulation, requirements to a "sound HSE culture" serves as an important policy statement in Norwegian regulations. It influences the whole institutional field to explore new approaches to safety. Introducing the concept of safety (or HSE) culture into the regulatory vocabulary has served as a sensitizing concept for both the regulator and the industry, thereby increasing both parties' ability to address informal and systemic aspects of safety.

1 INTRODUCTION

The way organizational (safety) cultures can influence upon safety-critical decisions, behaviour, interaction and communication has been extensively studied over the last three decades of safety research (e.g. Turner, 1978; Cox & Flin, 1998; Guldenmund, 2000; Richter & Koch, 2004; Hopkins, 2006; Reiman & Oedewald, 2006; Antonsen, 2009a; Nævestad, 2010; Rollenhagen, 2010; Blazsin & Guldenmund, 2015). Furthermore, the concept of culture has been highlighted in numerous investigations into a wide variety of disasters, such as the train derailment at Sjørsøya in Norway in 2009 (AIBN, 2011), the Fukushima nuclear meltdown (NAIIC, 2012) and the terrorist attacks in Oslo in 2011 (NOU 2012: 14).

The link between organizational culture and safety has also caught the attention of regulatory authorities. When the interest in safety culture meets the field of risk regulation, an important question arises: Are the intangible aspects of safety and organization out of regulators' reach, or is it possible for regulators to influence safety cultures in the industry they are set to regulate? This question contains two rather different dimensions. Firstly, it has a *regulatory* dimension by addressing the limits to the aspects of safety that can be made an object of regulation. Secondly, it has an *organizational* or *cultural* dimension as it concerns the way the internal dynamics of an organization are influenced by external factors, i.e. regulation, actors and discourses in the organizations' institutional environment. We aim to shed light on both dimensions by discussing the perceived effects of introducing the concept of culture into the Norwegian petroleum regulations.

In analyzing this question, we stand on the shoulders of the work of Kringen (2008, 2013), Karlsen and Valen (2011), Grote & Weichbrodt (2013) and Le Coze and Wiig (2013), who have previously studied the attempt to regulate HSE culture in the Norwegian industry.

2 CULTURE AND REGULATION IN THE NORWEGIAN PETROLEUM INDUSTRY

The Norwegian petroleum regulations are based on an assumption that it is, in fact, possible to regulate the intangible as the regulations include a specific regulatory demand to companies' health, safety and environment (HSE) culture:

A sound health, safety and environment culture that includes all phases and activity areas shall be encouraged through continuous work to reduce risk and improve health, safety and the environment. (Framework regulations §15).

After including the requirement to HSE culture in the regulations in 2002, the Norwegian Petroleum Safety Authority (PSA) made the intentions of the requirement known through seminars, publications and other channels. PSA also released an advisory booklet aiming to clarify the relation between culture and HSE where it underlined that it is up to each company to define what is to constitute a "sound HSE culture". This has led some authors to argue that the introduction of the concept in the framework regulation is more an instance of political rhetoric and "window dressing" than a basis for real regulatory practice (Karlsen and Valen, 2011). This indicates that the requirement for a sound HSE culture was highly controversial in the industry. Aiming to influence culture to some extent involves a break with the pervasive logic of accountability in regulation and safety management systems¹.

While the regulatory requirement uses the concept of HSE culture, our analysis focuses on the way the requirement has influenced measures related to safety. Thus, we have focused our analysis on a subset (safety) of the composite (HSE) that is covered by the requirement. The most important rationale behind this is that the ambition of the paper is to understand how using the concept of *culture* in regulation influences practices among the regulated companies. Focusing on the narrower concept of safety culture allows for a more focused analysis, and the possible differences between the way culture influences health, safety and environment are therefore not explored.

As the concept of safety (or HSE) culture has no agreed-upon definition, specifying government requirements to the cultures of organizations appears as a contradiction in terms. Given that it is hard to specify the meaning of safety culture, how do you perform regulatory supervision like audits or verifications of a company's culture? How can companies know whether they are actually in compliance or not? Last, but not least, how can you impose sanctions on a company, on the basis of the company not having the "right" culture? These are only a few of the questions that have been raised against the introduction of the requirement to a "sound HSE culture" in the Norwegian petroleum regulations.

These questions are certainly justified, particularly when regulation and regulatory supervision is seen as "command and control" activities aimed at verifying companies' compliance to a set of safety standards (Baldwin et al., 2012). While this is obviously an important part of a regulator's mandate and activity, this is not the only role regulators can play. As we will show, regulators can influence the

¹ Informal aspects of work, often important for safety, are hard to specify and define and tend to be "invisible" to the logic of accountability (see Almklov & Antonsen, 2014).

practices of their industry by setting agendas and by introducing new concepts that broaden the approach to safety, both within the regulator and the regulated companies.

3 REGULATION, CULTURE AND INSTITUTIONAL CONTEXT

The aim of this paper is to shed light on the relationship between regulation and safety culture. The theoretical toolbox needed to do this consists of three main strands of research: First, we will provide an overview of some of the literature on risk regulation. Second, the existing research into the link between safety culture and regulatory oversight will be briefly discussed. Third, we describe contributions from neo-institutional theory and research, which provide important perspectives on the relationship between companies and their contexts.

3.1 Regulation

There are many reasons for regulating. Broadly stated, the stated goal of regulation of industrial risk is usually to avoid or control the unintended side effects that industrial activity may have for the safety and well-being of people and the environment (see e.g. Power, 2004). Regulation is, however, a concept rarely defined with precision (Hood et al., 1999). They suggest the following definition: “the use of authority (often in the hand of specialized agencies) to set and apply rules and standards” (Hood et al 1999: 3). The key in this definition is that it is about governing through rules and standards. The term regulation, however, can entail different meanings. A restricted meaning of regulation will emphasize the application of a *set of commands* or rules by an agency that has been authorized for a certain purpose, while the most general meaning will include *all forms of social or economic influence*, including those that were not deliberately constructed as regulation (Baldwin et al. (2012:3). In the first sense, the role of the regulator is to perform inspections to find nonconformities, and the role of the regulated is to be compliant to rules and correct the nonconformities identified in inspections. In the latter sense, the role of the regulator becomes more blurry, as it will include more than just providing rules and performing inspections. The role of the regulator will be more related to the production of framework conditions conducive to the overall goals of regulation (e.g. Rosness et al. 2012). As the present study will elaborate, the relationship between the regulator and the regulated is not necessarily centered around questions of compliance and nonconformities alone.

3.1.1 Regulatory regimes

The differences in the meanings of the term regulation described by Baldwin et al. (2012) partly overlaps with descriptions of differences in regulatory regimes labeled as the *prescriptive* approach and the *performance-based* approach (Dahle et al., 2012). The *prescriptive approach* relies heavily on hard laws, legally binding rules often written in great detail and created by governmental agencies exercising the role of supervision. The second approach relies more on incorporating goal-oriented rules in the regulations by specifying performance level or desired outcomes expected by the regulator (Dahle et al., 2012).

The two types of regulatory regimes will entail different strategies of regulatory enforcement. The prescriptive approach to regulation is likely to be accompanied by a deterrence strategy of enforcements, where breaches of regulations are discouraged by utilizing penalties or legal sanctions. The performance-based approach emphasizes informal means of regulation, using methods involving education, diplomacy and persuasion (*ibid.*). The goal of this approach is to bring about compliance without resorting to sanctions or legal actions.

The Norwegian regulatory regime is strongly influenced by the latter approach, as it has been described as a form of "co-regulation" (Baram & Lindøe, 2014:35). This regulatory approach empowers the companies by giving the organizations the obligation to devise and implement their own safety system, referred to in Norway as *internal control* (Lindøe et al., 2012). Under this type of regime, the regulators avoid enacting detailed rules. Instead, they issue broadly stated legal standards and functional requirements when defining responsibilities of the enterprise. This, however, introduces the disadvantage of misinterpretation of regulatory requirements that are too broad or unclearly defined, something that we will discuss in relation to the industry's interpretation of the HSE culture regulations.

The regulatory practice in Norway is generally regarded to be based on a considerable degree of trust between the regulator and the regulated (Wiig & Tharaldsen, 2012). PSA's regulatory style facilitates and contributes to the improvement of communications between different industrial actors (operators, contractors, suppliers, unions), as well as motivates the companies into improving their own safety standards (Lindøe et al., 2012). The recognition of the legitimate role of the workforce is seen in the tripartite collaboration between regulatory authorities, unions, and companies. This cooperation is based on the welfare state model, egalitarian values and mutual trust between the actors (Lindøe et al. 2013). The unions are represented in various forums for collaboration: Regulatory Forum (RF), Safety Forum (SF), Working Together for Safety, and the Regulatory Competence project (a training program) (*ibid.*). PSA maintains a symmetrical partnership between public agencies and industrial actors but retains an asymmetrical relationship when exercising their role in sanctioning the industry when laws are violated (Lindøe et al., 2012).

Differences in regulatory regimes are important to take into account when considering possible ways the relationship between the regulator and the regulated can be operationalized. In the Norwegian context, the tradition of tripartite collaboration is an important aspect. This involves cooperation among authorities, industrial actors and unions (Moen et al., 2010). In this form of collaboration, the role of the workforce is recognized as legitimate in the relationships and the distribution of power between the regulator and the regulated (Lindøe et al., 2012). The Norwegian petroleum legislation is firmly hinged on the performance-based approach. This stands in some contrast to other regulatory regimes, such as the US where there is no tradition for tripartite collaboration and a more prescriptive regulatory regime. Thus, while the risks involved in running petroleum activities can be very similar across countries, there may be marked differences in the regulatory regimes devised to control these risks. One should be wary of viewing parts or sections of regulations in isolation from the overarching regulatory regime, as this forms the context in which requirements are interpreted and "translated" by the regulated companies.

3.2 Safety culture

Ever since the Chernobyl accident led to the joining of the terms "safety" and "culture", safety culture has been a key concept for research into the conditions for safety in organizations and has taken the role of a "holy grail" within practical efforts to improve safety. While there are several definitions and conceptualizations of safety culture, a common denominator seems to be that it has to do with the informal side of high-risk organizations. "Informal" here refers to the unwritten rules guiding the behavior and decisions of a group of people, as opposed to the formal rules that usually accompanies high-risk activities (Antonsen, 2009). The term informal also implies that culture often refers to something that is tacit and hard to grasp and understand for outsiders. One could also add

that the term culture is often described as something systemic in the sense that it is more than the sum of its parts; it cannot be reduced to the properties of any of its constituent parts².

The concept of culture always invokes some boundary, i.e. it draws some kind of line between the members of a group and the ones that are considered not members of the group. The concept of organizational culture will therefore by definition have several interfaces with the organizations' surroundings. An example of this is found in the way organizational culture is defined by Schein (1992) as consisting of basic assumptions that are related to *both* the internal integration of the group and the external adaptation to the group's environment. The latter part pertaining to external adaptation is often overlooked in studies of safety culture, which tends to focus on the internal aspects of culture. This is particularly important for this paper, as regulation will be an obvious source of external influence to which organizations must adapt. There is every reason to believe, therefore, that there will, in fact, be a relationship between regulation and safety culture.

While the relevance of regulation for understanding culture is fairly uncontroversial, the relevance of the concept of culture for regulation is more of a leap into the unknown. As something that tends to emerge over time out of the social interaction of human beings, to a large extent tacit and taken for granted, it is no wonder that the concept of culture may seem as "matter out of place" in formal risk regulation³. Despite this, the concept of culture keeps attracting interest from regulators from a variety of countries and industries.

3.2.1 Safety culture and regulatory oversight

The Norwegian Petroleum Safety Authority is not the only agency that has attempted to include safety culture in regulations and regulatory activities. Similar developments have been undertaken in the nuclear sector. Bernard (2014:2) describes a new model for "safety culture observation" that regulators could add to their existing approach to regulation by enabling a holistic and systemic perspective on safety. Although safety culture cannot be regulated in a direct manner, it provides an opportunity for the regulator to engage the regulated in a continuous improvement of the organization. According to Bernard (2014), a shift in the perspective of regulators is needed. Through observation, it is possible to broaden the regulatory body's grounds for intervention as well as provide the regulator with a deeper understanding of the frames of reference of the regulated.

The International Atomic Energy Agency (IAEA) has long recognized the need for a 'strong safety culture' for the nuclear industry's success and viability (IAEA, 2013). They also provide advice for regulators aiming to include aspects of safety culture in their regulation and supervisory activities. The IAEA underlined that the regulatory body should refrain from establishing detailed requirements or regulating safety culture as a whole. Rather, it is more constructive to introduce a general requirement on management systems in order to address their expectations regarding safety culture (IAEA, 2013). Their fundamental principle lies on the notion that the primary responsibility rests on the licensee whose activities or facilities engender risks to individuals, the environment or the

² This understanding of culture is somewhat more debated, as proponents of behaviour-based safety have merged the concept of culture strongly to individual behaviour and attitudes, thereby downplaying the social aspect of culture.

³ Paraphrased from Douglas (2002).

society. They provide three important pillars in safety culture oversight (IAEA, 2013). First, common understanding of safety culture is pivotal in the communications and promotion of safety culture. Second, dialogue is necessary for sharing information, solutions and clarifying their respective roles. Finally, the continuous engagement of the licensee and the steady influence of the regulator on engaging the licensee is crucial in the development of a strong safety culture.

The publications from the nuclear industry provide guidance on how to include perspectives on safety culture in regulatory activities. There are, however, few empirical studies examining the experiences, and discussing whether a regulator can actually hope to influence safety cultures in the industry they are set to regulate.

3.3 Neo-institutional theory

The relationship between the regulator and the regulated is often conveyed through simple bilateral models, i.e. where the regulator provides rules, and the regulated find the appropriate measures to comply with these rules. While such models are not wrong, we argue that they are based on an overly simplistic model of the relationship between the regulator and the regulated. It is the contention that the relationship between the two does not take place in an institutional vacuum. On the contrary, they find themselves in a context where there are other actors that can strongly influence both the regulator and the regulated. We argue that this calls for a neo-institutionalist perspective, primarily out of two reasons. The first reason is that neo-institutionalist perspectives provide us with a wider view of why and how organizations behave the way they do (Greenwood et al., 2008). A regulator is a powerful actor within an institutional field which can serve to shape organizational behavior because their 'regulatory frameworks embody, enact or transmit societal norms and values' (Greenwood et al., 2008:5). However, an institutional field consists of more actors than just the regulator and the regulated (DiMaggio and Powell, 1983). Analyzing the relationship between the regulator and the regulated as parts of a wider institutional field can provide new insight into the complex relationships that influence organizations' behavior.

The second reason for taking a neo-institutionalist perspective is that neo-institutional theory discusses how ideas and concepts travel through time and space (Røvik, 2007; Czarniawska & Joerges 1996). The concept of translation (see Latour, 2005) is used to discuss the process whereas ideas meet organizations and is reconfigured by the interactions with structures, institutions and people trying to give it a meaning in their own organizations. In our case, the concept of HSE culture can be seen as an object that is constructed by actors in the Petroleum Safety Authority, manifested in the regulations and interpreted in many ways by different organizations. An idea is turned into an object, which is turned into an idea again. It is 'transferred from [its] time and place of origin and materialized again elsewhere.' (Czarniawska & Joerges 1996:18). The translation of a concept depends not only on how it is understood by people, but also how it fits with and is made to align with already institutionalized practices, structures and technologies, and influence from other actors within the institutional field. Examples of institutionalized practices in this respect may be incident reporting systems, union-employee relations, contracts, existing programs addressing HSE (individually or collectively), influence from other companies or lessons learned from major accidents, to name a few.

3.4 Previous research

Several authors have studied the genesis and the enforcement of the introduction of the requirement to a "sound HSE culture" in the Norwegian petroleum regulations (e.g. Le Coze & Wiig,

2013; Kringen, 2013; Karlsen & Valen, 2011). In addition, there has been some international research on the possibility of regulating the intangible (e.g. Grote and Weichbrodt, 2013)

Most publications remain highly skeptical about the usefulness of culture as a regulatory concept. Some have argued that regulators should "stay away from safety culture and stick to rules instead" (Grote and Weichbrodt, 2013: 225; Kringen, 2013: 220) and that such a polysemous concept as culture 'creates confusion and may distract attention away from the more tangible and operational issues' (Kringen 2013:220-221). Le Coze and Wiig (2013) explored the PSA's challenges in regulating safety culture and the industry's manner of tackling an ambiguous concept to predict the effects of the cultural concept in French regulation. They conducted interviews with six representatives from the PSA at various levels. The study revealed difficulties among engineers, who were already versed in a systems perspective, in seeing the value of section 11 especially in its application to audits and investigations. The ambiguous concept of culture created confusion not only for the industry but also for the inspectors representing the regulatory authority itself (Le Coze and Wiig, 2013). According to their study, to some of PSA's representatives, it was challenging to translate the notion into their traditional activities such as audits and accident investigations. The same can be said with regards to the industry, which translated the polysemous concept into large scale culture programs that were far from the regulator's intentions with the paragraph. Le Coze and Wiig (2013), however, also opens for the opportunity that the introduction of the cultural dimension allowed the industry to explore areas of safety management that traditional approaches seem to be lacking. By acting as a sensitizing concept (Blumer, 1954), the concept enabled both the industry and the regulator to address issues that had not previously been addressed. This view is supported by Kringen, stating that the 'cultural experiment provided an opportunity for reflection and encouraged different views on improving safety in complex processes in the organization (Kringen, 2013:220). Kringen's doctoral dissertation presents a case study of how and why the concept was integrated into their regulatory policy and vocabulary. His study aimed to understand the motive behind the introduction and the outcome of this introduction. Documents, qualitative interviews and participant observations that comprised his study were data from 2005 to 2006. The study investigated deeper into the historical context of the concept's origins. Kringen describes the program introducing the HSE culture requirement as a regulatory strategy that eventually dissipated. He attributes this lack of vitality due to several factors, among them was the absence of an orderly manner of studying how the concept should be positioned in relation to existing regulations. The present paper is a continuation of the work of Kringen (2008, 2013) and Le Coze and Wiig (2013). It adds to the existing knowledge by studying both the regulator and the regulated and the broader institutional field that exerts influence on both the regulator and the regulated.

4 METHODS

4.1 Interviews

Retrospective interviewing was performed in order to collect data for the empirical study. The word retrospective refers to looking back at events that have already transpired. The main focus of the interview of informants from the regulator was the introduction of the HSE culture paragraph into the Framework Regulations while the representatives from the regulated were asked about the development of the respective safety programs.

4.2 Interview process

The interviews were semi-structured, meaning that they were based on an interview guide consisting of open-ended questions, where the order of the questions was allowed to vary in each interview. The semi-structured approach allows the members of the project to conduct interviews in a more-or-less similar manner while providing an opportunity for informants to give descriptive answers, as well as open up for other interesting issues related to the research topic (Yin, 2014). The semi-structured interview also facilitated a less formal and conversational way of gathering information. This allowed the informants for this study to choose the manner and depth of their answers (*ibid.*). The interviews lasted from around 50 to 70 minutes.

8 representatives from the regulator were interviewed, while 13 informants represented the regulated. These informants were selected strategically to provide information on the background and use of the HSE culture section in the regulations, and the development and implementation of safety culture programs and activities in three Norwegian oil companies. The culture programs were carried out at different points of time over the last decade. The interviews were conducted either through personal interviews or through video conference.

It is worth noting that none of the informants are sharp-end workers. The sample was chosen to gain information about the relationship between regulation and companies' safety management activities and therefore workforce or the sharp end will not be analyzed in this study. Nonetheless, the subjects provided key information on the projects.

4.3 Reflections on methods

Retrospective interviewing focuses on events that have transpired in the past. Failure to recall past events is generally considered as a source of error. This is attributed to the difficulty in putting oneself in the past and recalling the sequence of events and detailed information such as dates and names. In this study, however, the use of retrospective interview does not focus on these details. We deliberately avoided asking questions regarding specific incidents, encounters, communications, relationships etc. that required an accurate recollection of past events. Still, retrospective interviewing has weaknesses in that the informants' stories may be shaped by collective narratives that develop over time as the involved actors make collectively make sense of events and previous discussions (see e.g. Nævestad's analysis of how informants make sense of accidents according to different cultural models) and they may obscure important conflicts or developments. This weakness was compensated by the researchers' knowledge of the earlier, more synchronous research (e.g. Kringsen, 2008) and public documents on the HSE culture paragraph from the entire period.

The interviews invited key informants to reflect over processes and developments as they unfolded over time. They looked back at the process from its inception to the process reaching full circle. In this approach, the informants were asked to unveil information from the past with the vantage point of remaining in the present. We view this as a strength rather than a weakness in the methodic approach. The strength in this approach of collecting empirical data lies in the ability of the informant to look back and assess the events armed with the *benefit* of hindsight.

5 EMPIRICAL RESULTS: INTRODUCING SAFETY CULTURE INTO LEGISLATION

5.1 The early years: Confusion and negotiation

There is no doubt that introducing the concept of culture into regulation was a highly controversial move, both within the PSA and in the industry at large. The fear within the PSA was that the concept of culture was so vague and ambiguous that it would be impossible to supervise and that there was no telling what the oil companies' response would be.

I knew that this was quite difficult [for the companies] to work with seriously. To put it this way, I thought, this is going to be food for the unserious actors, and I was right. [...] There were some coming up with simple solutions and selling them... simple measures that only have a limited effect on culture, being sold as the great truth. [...] Yes, food for the consultants. (representative of the regulator).

Where the intentions behind the regulation were to draw attention to social relationships within organizations and the systemic aspects of safety, the industry's response was seen as being based on an individualistic punishment/reward model

There were many international consultant solutions around. One was [culture] surveys coming up as a one-sided solution to it [the requirement]. The other was that much of the responsibility was placed on the individual and the first programs that were initiated included a lot of individually oriented contracts. [...] For instance, t-shirts that say "I am responsible for safety here". (representative of the regulator).

There are two important messages to take out of the variegated history of the culture requirement. One is that regulatory requirements within a functional regulatory regime will take the form of a negotiation process regarding the interpretation of requirements and the operationalization of responses. The other is that confusion about regulation quickly creates a demand for consulting. Consulting companies sometimes serve as important voices in interpreting how regulatory compliance can be achieved and how companies should go about improving safety. This illustrates that the institutional field surrounding the regulator and the regulated can exert a strong influence on both parties, and the relationship between them. We will return to this question in section 5.7.

5.2 Sensitizing the regulator

The ultimate goal of regulation is to influence the actions of the regulated. PSA's intention with introducing the requirement to a sound HSE culture was to stimulate the Norwegian industry to look for new ways to improve safety (Kringen, 2008). The regulations can, however, have effects *within* the organizational boundaries of the regulator by expanding the existing perspectives and methods for supervisory activities.

At the time of its inclusion in the Framework Regulations, no other authority has done the same. It was a unique case, a "Norwegian phenomenon". Not everyone in the PSA were positive towards the inclusion of HSE culture in the framework regulations. Some of the individuals interviewed meant that culture is too challenging a concept to define and that it was unsuitable for dichotomization, *i.e.* good or bad. PSA can also, to some extent be described as a "technical culture" in the sense that it is predominately staffed with highly qualified engineers. Many of these found it difficult to relate to an abstract, "soft" and vague concept like culture. Reflecting back on the possible downside of the

introduction of the HSE culture paragraph, one informant revealed a major source of concern: How would engineers within PSA approach the requirement in their supervision? The informant was worried that engineers would develop some sort of checklist approach to the oversight of HSE culture.

The fear that culture would be reified into an audit checklist proved unwarranted. Our informants describe a development where engineers have gradually grown accustomed to the paragraph and started to see the use of it.

We were in a meeting yesterday which was interesting, because there were people there that I wouldn't expect to get anywhere near culture, that had just got back from an investigation. They [the investigation team] actually considered issuing an order based in the culture paragraph. They didn't do it, but I liked the way they were thinking. It was quite revolutionizing, a positive development (representative of the regulator).

In addition to exemplifying how the concept of culture has served as a sensitizing concept to include new perspectives into regulatory practice, the above passage illustrates that PSA has adopted a policy to not use the requirement to a sound HSE culture as the legal basis for issuing orders to companies. This was a recurring theme in the interviews. The concept of HSE culture seems to have served as a vehicle for developing new understanding and new approaches within the regulator. It stimulates the regulator toward innovation by providing a boundary object (Star and Griesmer, 1989) between different disciplines and raises the status and awareness of human and organizational factors among the engineers within PSA. The term "boundary object" is often used in organizational theory to refer to concepts that are plastic to take on different meanings in different contexts, but which are still recognized as being the same. Star (2010: 604), reflecting on the different usages of the term, states that her "initial framing of the concept was motivated by a desire to analyze the nature of cooperative work in the absence of consensus." The lack of consensus in terms of how to understand the HSE culture concept did not paralyze the involved actors, rather it seems to have influenced both practices and thought regarding safety.

The internal sensitizing is, in many ways, a prerequisite for achieving the ultimate ambition to expand the industry's existing approaches to safety. Regulations are obviously an important basis of the communication between the regulator and the regulated. The quality of answers a company is able to give are dependent on the quality of questions the regulator is able to ask. Therefore the maturation of the understanding of culture internally in PSA is important for the requirement to have any effect.

It took me a long time to see the justification of that paragraph. I have an engineering background and didn't have the necessary qualifications to get it and see the point with it. Now I can defend it from here to eternity (...). [Interviewer:] What is it that you find useful with it? First and foremost, I hope that it is a paragraph that we will never use as the legal basis for a decision. (...) But I believe it is profoundly important to have in order to underline the importance of context for safety, work environment, health and so on (...) And I believe it can play an extremely important part when it comes to communicating important aspects related to framework conditions and context to the industry (representative of the regulator).

In this use, the requirement to a sound HSE culture states an intention and an overarching ambition more than a concrete requirement. In the taxonomy of Hale et al. (2013), it should be taken as a goal more than an action/state rule. Moreover, it is used as a basis for communication around new issues

and other aspects of safety and will thus have other areas of use than what is the case with more detailed rules.

5.3 Sensitizing the industry

When the regulator introduced the requirement to a "sound HSE culture", it was considered important that the requirement was broad enough that the companies could themselves decide what was a meaningful understanding and approach:

[I]t was important to have a scientific anchoring, but not to lock on to one disciplinary perspective. They were more interested in forwarding and understanding of what this might be and how it may express itself, how to approach it, how to understand it, but not so much methodically how to attack/approach it really. That was a way one didn't want to go, for the companies do that, and it is sort of implicit in the function based regime too that the authorities shouldn't provide the solutions, but rather give guidelines [point out directions], and then it is for the companies themselves to decide how it should be solved. They know this better themselves. That's how we reasoned back then (representative of the regulator).

The "travel" of the concept of HSE culture between the regulator and the regulated thus left several degrees of freedom for translating the concept from a regulatory level to the internal practices of the companies. This created considerable confusion in the industry, some of which still seems to be present in the industry as our data from the operating companies show a great deal of variation. First of all, the conceptualization and understanding of culture, unsurprisingly, varies both between companies and within companies (see Høivik et al., 2009). Second, when describing their efforts to improve safety culture, not all of the company informants saw their efforts as a direct response to regulations. The requirement on HSE culture added weight to already existing discussions on the need for culture "programs", but these were still activities the companies would have undertaken anyway. Thus, the concept of safety culture was by no means unknown to the industry. Incorporating it into regulations, however, spawned a great deal of efforts to make sense of the concept, and searching for how it could be useful in safety management.

They [PSA] received so much criticism. "What on earth do they want with that requirement?" That was the main feedback. It was not concrete enough (...) I think that PSA was very brave in introducing that paragraph. It resulted in many discussions (...) I think it was a very good process (representative of the industry).

The confusion could, in many ways, be considered productive. This is in line with research on individual creativity, finding that the tolerance of ambiguity is a key factor in explaining creativity (Dacey 1989). In a similar vein, Wildavsky (1988) noted that concerns regarding liability and (US) tort laws contributed to an understanding and management of safety that focused on anticipation (avoiding known problems) rather than resilience, and argued that this could harm the innovative search for safety within the industries. The HSE culture concept provides a language to address such issues, and the legal basis for putting it on the agenda in the tripartite dialogue between regulatory authorities, companies and trade unions.

5.4 A legal basis for new regulatory practices

Up to this point, the presentation of empirical results has been focused on the sensitizing processes that have unfolded within both the regulator and within the regulated companies. Regulatory demands are, however, about more than sensitization and learning. Regulation is also about

providing a legal framework that influences the leverage for both the regulator and the regulated. For PSA, the introduction of HSE culture in the Framework regulations provided them with a legal basis for asking new questions and for experimenting with new methods for supervision.

5.4.1 Asking new questions

All informants in PSA view the HSE culture paragraph as involving an emphasis on the systemic aspects of safety. It allows for addressing not only issues related to design, maintenance or safe operations, but also to bigger organizational issues related to corporate governance. One informant described this as an imbalance, where the overarching organizational issues are too rarely addressed as issues relevant to safety:

I feel that there is an imbalance [on issues of safety]. I'm not saying that there should only be a macro perspective and not a micro perspective, but the micro perspective is very dominant and the macro perspective is not very rich. (...) Work needs to be done regarding the awareness over the consequences of decisions which seemingly have nothing to do with safety, but that in reality are hyper-important for safety. The top manager doesn't need the risk analysis of a valve. But that is what his safety people want to tell him, implicitly or explicitly. I find that very destructive (representative of the regulator).

Addressing "macro" issues also means targeting "macro actors". The HSE culture paragraph is by some described as involving a shift toward the role of top management in creating good conditions for safety in the organization:

We've been asking simple questions. "What kind of information do you have on your desk that tells you how things are actually going" [regarding safety]. And they can't answer that, they revert to the accident statistics that they are presented with once a month. They need to have information to be able to manage the company and develop the company (representative of the regulator).

In this respect, the HSE culture paragraph has provided a legal basis to address a new "audience" of supervision and regulatory follow-up. It has been part of an increasing focus on the role of top managers in reducing the risks for major accidents.

5.5 Regulating without rules?

As has been previously indicated, the HSE culture paragraph was never intended as a prescriptive rule and has not been enforced like one. It has the characteristics of a policy statement, stating clearly that authorities and the society at large expect nothing but the best when it comes to prioritizing safety at all levels of the industry. It should be seen in close relation to the vision of the Norwegian petroleum sector to be "world-leading in HSE" (White Paper nr. 7 2001-2002). It should be seen as emphasizing continuous improvement, as one of the informants explained:

To have a requirement that says to the industry that we should develop a sound HSE culture is a very important signal. It provides PSA the opportunity to be more strategic in its approach to the idea of improvement that we are working with all the time (representative of the regulator).

Informants from both PSA and the industry underline that the activities of the regulator are not only about rules and requirements. Asked to describe the role and activities of PSA, one of the PSA informants made the following description:

Our task is twofold: One is to be society's watchdog through supervision and check that they comply with regulatory requirements. The other is to be a driving force (...). This means that we have to be active in trying to drive the industry to move in the right direction. And we do this through many measures (representative of the regulator).

The introduction of the HSE culture paragraph is related to the role as "driving force", and the ambition to facilitate continuous improvement in the industry. The toolbox used to perform the role of a "driving force" range far beyond devising and enforcing rules: Pamphlets and guidelines, seminars, lectures at universities and conferences, publication of papers at conferences and creating arenas for reflection/discussion among the actors in the industry are among the methods used. In this way, the HSE culture paragraph is backed up by several regulatory activities, without being used as a legal basis for issuing orders toward companies.

5.6 Making sense of regulation – the companies' response

As already indicated, and as has been thoroughly described in Kringen's (2008) account of the history of the HSE culture regulation in Norway, the industry's response to the new regulations was safety programmes influenced by behaviour-based safety (BBS). While the authorities' intention with the HSE culture paragraph was to emphasize the systemic and holistic properties of safety, the industry's response was largely directed towards the attitudes and behaviour of front-end workers. This interpretation came as somewhat of a surprise to the regulator. The authorities, in turn, responded to the industry's interpretation of the paragraph by changing the wording of the paragraph. The initial wording of the paragraph stated that

"[t]he party responsible shall encourage and promote a sound health, environment and safety culture comprising all activity areas and which contributes to achieving that everyone [our emphasis] who takes part in petroleum activities takes on responsibility in relation to health, environment and safety" (Framework regulations §11 requirement from 2002.

The paragraph was updated to the following text:

A sound health, safety and environment culture that includes all phases and activity areas shall be encouraged through continuous work to reduce risk and improve health, safety and the environment. (Framework regulations §15, current requirement).

In the updated version, the regulator refrained from emphasizing the word "everyone" in its attempt to divert interpretation from individually focused solutions.

The divergence between the regulator's intentions and the response of the regulated have been described in detail by Kringen (2008, 2013) and Le Coze & Wiig (2013) and will not be repeated here. There is, however, an important lesson to extract from this: Within a performance-based regulatory regime, the interpretation and effects of regulation are the results of "negotiation processes". As long as it is always the responsibility of the operating company to select measures and demonstrate that they are compliant with the regulations, there is no guarantee that new regulations and requirements are interpreted in accordance with the regulator's intention. Furthermore, the regulator and the regulated are by no means the only actors in this negotiation process. This will be described in the next sections.

5.7 Regulatory agendas and the institutional field

In understanding the interaction between the regulator and the regulated, it is critical to recognize that the process is not dyadic. When the relationship between the regulator and the regulated is seen from a neo-institutional perspective, it quickly becomes clear that the regulator produces framework conditions that influence more actors than the companies directly subject to regulations. It influences the entire institutional field. For instance, various governance signals from PSA will be picked up by consulting agencies, suppliers, and others. These companies have a continuous interest in knowing what will be the industry's priorities to be able to win projects or develop new services. The governance signals may include the publishing of pamphlets and guidelines, the selection of prioritized areas to be focused on in supervisory activities, or the HSE culture paragraph. When the regulator makes statements saying "this is important", there are several actors external to the regulator and the regulated that will have interests in framing and interpreting the governance signals in a way that either provides grounds for new services, or can be used to legitimize the importance of existing services and approaches.

Second, there are several extra-organizational influences that affect *both* the intention of the regulator and the interpretation of the regulated. Both PSA and the oil companies are in contact with research communities which can be a source of inspiration, interpretations or further confusion. The regulators of other countries can also be a source of influence, as can the mass media, particularly when major accidents like the Deepwater Horizon occurs. As a consequence, the relationship between the regulator and the regulated is not unidimensional. On the contrary, it can be largely unpredictable and can have an element of "garbage can" decision making in that problems and solutions are joined more on coincidence than rational consideration (March 1994).

When it comes to the most general aspects of regulation, such as requirements for a "sound HSE culture" or "continuous improvement"⁴, the role of the regulator is as much related to setting the agenda for an entire institutional field as it is to the bilateral communication between the regulator and the regulated. This is regulation in a much broader sense than the prescriptive, "command and control" approach. It refers to a more indirect form of influence where the aim is more related to specifying the overarching goals of regulation than it is to determining compliance or spotting nonconformities.

6 CONCLUDING REMARKS - SEARCHING FOR SAFETY

As was described in the introduction, understanding the possible role of safety culture in regulation contains both a regulatory dimension concerning the limits to risk regulation and an organizational dimension concerning the relationship between organizations and their environments.

Along the regulatory dimension, a key question to be answered in this study was how the effects of introducing the concept of culture into legislation were perceived by the regulator and the regulated. Our results indicate that ambiguous concepts like culture may actually have a function in regulation, despite exceeding the grasp of traditional command and control regulation. Our study has shown how regulators may introduce regulation which is not devised to be the basis for audits or the issuing

⁴ The term "continuous improvement" is also used in the Norwegian Petroleum regulations, more specifically the Management Regulations §6

of statutory orders, but which nevertheless provide direction for both the companies in the industry, consulting companies providing services to the industry and the internal practice of the regulator. Provided that the regulatory regime allows for it, a regulatory authority may take on a more proactive, informative role, in addition to the traditional control activities. By facilitating dialogue and creating arenas for learning between the different actors in the industry, the regulator can serve as a driving force in the search for continuous improvement. Importantly, this involves influencing the agenda of the whole institutional field, including consultants, researchers, media and other public agencies.

One of the most dominant criticisms against introducing the concept of culture into the petroleum regulations was that it is notoriously vague and polysemous. On closer inspection, however, there are several instances where the petroleum regulations were already equally polysemous. For instance, section 10 of the Framework regulations states a requirement that "all activities shall be prudent", without further specification of what it means that activities are prudent and how compliance with the requirement is to be determined. An example from international maritime regulations could also be mentioned, where there are several sections stating requirements to "good seamanship", a concept that is notoriously hard to define. Thus, polysemy and intangible requirements are by no means strangers to already existing and well-established regulations. This does not, however, take away the fact that the introduction of the requirement created a great deal of confusion and one cannot exclude the possibility that this confusion and the buzz around the concept of safety culture served to divert attention from other important issues such as design and technical safety.

Aiming to regulate the intangible in some ways involves a break with the logic of accountability and internal control. How can you audit the level of compliance with a paragraph requiring companies to have "sound HSE cultures"? The answer is that you don't have to. There are several ways a regulator can influence companies and the industry it is set to regulate, and the formal role of rule-audit-sanctions is only one. The regulatory authorities make use of several channels for influence, such as pamphlets and guidelines, seminars, investigation reports, dialogue meetings with the industry, and use of mass media. This indicates that a regulator's toolbox can consist of more than audits and sanctions, and that different parts of regulations may require different strategies for achieving the intended results.

Along the organizational dimension, we find that the internal dynamics of organizations are influenced by external factors. This is in many ways self-evident but has been underplayed by research on organizational (safety) culture which tends to treat each organizational culture as independent and unique (Martin 1992). By stimulating the companies of the petroleum industry to start considering how aspects of their organizational culture may influence safety in their organization, PSA is addressing a basic assumption of the regulated companies, namely what constitutes the limits and scope of safety management. Importantly, this does not involve PSA trying to "define" or "shape" what the various organizational cultures should look like. It merely involves pushing key stakeholders within the different organizational cultures to start reflecting on how they could find new ways to improve safety. This is an open-ended and unpredictable process. It is an example of how changes in regulatory framework conditions can involve changes in the growing conditions of cultures, which in turn can be a source of cultural change.

In addition to regulation being a source of external influence on the regulated companies, we find that there are other external factors influencing both the regulator and the regulated. The external factors include influence from trade unions, academia, consultants, media exposure, market trends

and major accidents in other parts of the industry. Such external factors appear to play a more important role than what is commonly recognized within safety culture research.

Some of the effects described above come about *because* of the ambiguity of culture, rather than in spite of it. Within the industry and throughout our project, the ambiguity with which the word culture has been surrounded has been confusing. A regulatory statement based on a vague concept like this is contrary to the pervasive logic of risk regulation (see e.g. Power, 2007). However, taking a pragmatic perspective to the term, looking at what it does rather than what it means, may take us beyond merely criticizing the inconsistency of the regulator. To some extent, the need for conceptual stringency in the various parts of regulation is secondary to the more pragmatic need to influence the industry to take further steps to reduce risk. Seen from this angle, ambiguity has a productive function. It broadens the discourses of safety in the industry and sends the confused companies searching for safety beyond the places they would normally go.

Acknowledgements: The article is part of the research project *Translating HSE culture in the Petroleum Industry*, project No. 220550, funded by the Norwegian Research Council's PETROMAKS program.

7 REFERENCES

- AIBN (Accident Investigation Board of Norway) 2011. *Report on railway accident with freight car set that rolled uncontrolledly from Alnabru to Sydhavna on 24 March 2010*, Lillestrøm, Accident Investigation Board of Norway.
- Almklov, P. G. & Antonsen, S. 2014. Making work invisible: New Public Management and operational work in critical infrastructure sectors. *Public Administration*, 92, 477-492.
- Antonsen, S. 2009. *Safety culture: theory, method and improvement*, Farnham, Ashgate.
- Baldwin, R., Cave, M. & Lodge, M. 2012. *Understanding regulation: theory, strategy, and practice*, Oxford, Oxford University Press.
- Baram, M. S. & Lindøe, P. 2014. Modes of risk regulation for prevention of major industrial accidents *In: LINDØE, P., BARAM, M. S. & RENN, O. (eds.) Risk Governance of Offshore Oil and Gas Operations*. Cambridge: Cambridge University Press.
- Bernard, B. 2014. Safety culture as a way of responsive regulation: Proposal for a nuclear safety culture oversight model. *International Nuclear Safety Journal*, 3, 1-11.
- Blazsin, H. & Guldenmund, F. 2015. The social construction of safety: Comparing three realities. *Safety Science*, 71, Part A, 16-27.
- Blumer, H. 1954. "What is Wrong with Social Theory." *American Sociological Review* 18 (1954): 3-10.
- Cox, S. & Flin, R. 1998. Safety Culture: philosopher's stone or man of straw? *Work Stress*, 12, 189-201.
- Czarniawska B. & Joerges, B. 1996. Travels of ideas, in Czarniawska, B. & G. Sevón (eds): *Translating Organizational Change*, pp 13-48. Berlin: Walter de Gruyter.
- Dacey, J. S. 1989. *Fundamentals of Creative Thinking*, Lexington, MA, Lexington Books

- Dahle, I. B., Dybvig, G., Ersdal, G., Gulbrandsen, T., Hanson, B. A., Tharaldsen, J. E. & Wiig, S. 2012. Major accidents and their consequences for risk regulation. In: Berenguer, C., Grall, A. & Soares, C. G. (eds.) *Advances in Safety, Reliability and Risk Management: ESREL 2011*. London: Taylor & Francis Group.
- DiMaggio, P. J. & Powell, W. W. 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, 48, 147-160.
- Douglas, M. 2002. *Purity and danger: an analysis of the concept of pollution and taboo*, London, Routledge.
- Engen, O., Moen, A. & Lindøe, P. 2012. Regulatory response to hazards: Case studies from the Norwegian petroleum industry. In: Berenguer, C., Grall, A. & Soares, C. G. (eds.) *Advances in Safety, Reliability and Risk Management: ESREL 2011*. London: Taylor & Francis Group.
- Greenwood, R., Oliver, C., Suddaby, R. & Sahlin-Andersson, K. 2008. *The Sage handbook of organizational institutionalism*, Los Angeles, Sage.
- Grote, G. & Weichbrodt, J. 2013. Why regulators should stay away from safety culture and stick to rules instead. In: Bieder, C. & Bourrier, M. (eds.) *Trapping safety into rules. How desirable or avoidable is proceduralization?* Farnham: Ashgate.
- Guldenmund, F. W. 2000. The nature of safety culture: a review of theory and research. *Safety Science*, 34, 215-257.
- Hopkins, A. 2006. Studying organisational cultures and their effects on safety. *Safety Science*, 44, 875-889.
- Høivik, D., Moen, B. E., Mearns, K. & Haukelid, K. 2009. An explorative study of health, safety and environment culture in a Norwegian petroleum company. *Safety Science*, 47, 992-1001.
- IAEA 2014. *Regulatory Oversight of Safety Culture in Nuclear Installations*, Vienna, INTERNATIONAL ATOMIC ENERGY AGENCY.
- Karlsen, J. E. & Valen, H. 2011. The social construction of HSE culture - The Case of Norwegian Petroleum. *Safety Science Monitor*, 15.
- Kringen, J. 2008. *Culture and control. Regulation of risk in the Norwegian petroleum industry*. University of Oslo, Oslo,.
- Kringen, J. 2013. Proceruralization and regulation of culture: Experiments on the frontiers of risk regulation. In: BIEDER, C. & BOURRIER, M. (eds.) *Trapping safety into rules. How desirable or avoidable is proceduralization?* Farnham: Ashgate.
- Latour, B. 2005. *Reassembling the Social: An Introduction to Actor Network Theory*. Cambridge: Cambridge University Press
- Le Coze, J.-C. & Wiig, S. 2013. Beyond procedures: Can 'Safety Culture' Be regulated? In: Bieder, C. & Bourrier, M. (eds.) *Trapping safety into rules. How desirable or avoidable is proceduralization?* Farnham: Ashgate.
- Lindøe, P., Baram, M. & Braut, G. S. 2012. Empowered agents or empowered agencies? Assessing the risk regulatory regimes in the Norwegian and US offshore oil and gas industry. In: Berenguer, C., Grall, A. & Soares, C. G. (eds.) *Advances in Safety, Reliability and Risk Management: ESREL 2011*. London: Taylor & Francis Group.

- Lindøe, P., Baram, M. & Braut, G. S. 2013. Risk Regulation and Proceduralization. An Assessment of Norwegian and US Risk Regulation in Offshore Oil and Gas Industry. In: Bieder, C. & Bourrier, M. (eds.) *Trapping safety into rules. How desirable or avoidable is proceduralization?* Farnham: Ashgate.
- March, J. G. 1994. *A primer on decision making: how decisions happen*, New York, Free Press.
- Martin, J. 1992. *Cultures in organizations: three perspectives*, New York, Oxford University Press.
- Moen, A., Blakstad, H. C., Forseth, U. & Rosness, R. 2009. Disintegration and revival of tripartite collaboration on HSE in the Norwegian petroleum industry. In: Bris, R., Soares, C. G. & Martorell, S. (eds.) *Reliability, risk, and safety : theory and applications : proceedings of the European Safety and Reliability Conference, ESREL 2009*. Boca Raton: CRC Press.
- NAIIC (The Fukushima Nuclear Accident Independent Investigation Commission). 2012. *The official report of The Fukushima Nuclear Accident Independent Investigation Commission*, The National Diet of Japan.
- NOU 2012: 14. 2012. *Rapport fra 22. juli-kommisjonen (Report of the 22. July Commission)*. Oslo: Departementenes servicesenter - informasjonsforvaltning.
- Nævestad, T.-O. 2010. Evaluating a safety culture campaign: Some lessons from a Norwegian case. *Safety Science*, 48, 651-659.
- Power, M. 2004. *The risk management of everything: Rethinking the politics of uncertainty*. London, Demos.
- Reiman, T. & Oedewald, P. 2006. Assessing the maintenance unit of a nuclear power plant – identifying the cultural conceptions concerning the maintenance work and the maintenance organization. *Safety Science*, 44, 821-850.
- Richter, A. & Koch, C. 2004. Integration, differentiation and ambiguity in safety cultures. *Safety Science*, 42, 703-722.
- Rollenhagen, C. 2010. Can focus on safety culture become an excuse for not rethinking design of technology? *Safety Science*, 48, 268-278.
- Rosness, R., Blakstad, H. C., Forseth, U., Dahle, I. B. & Wiig, S. 2012. Environmental conditions for safety work – Theoretical foundations. *Safety Science*, 50, 1967-1976.
- Røvik, K. A. 2007. *Trender og translasjoner: Ideer som former det 21. århundrets organisasjon (Trends and translations: Ideas shaping the organization of the 21st century)*, Oslo, Universitetsforlaget.
- Star, S., Griesemer, J. 1989. Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science* 19 (3): 387–420.
- Turner, B. 1978. *Man-Made Disasters*, London, Wykenham Science Press.
- White Paper nr. 7 2001-2002. 2001. *Om helse, miljø og sikkerhet i petroleumsvirksomheten (On health, environment and safety in the petroleum activity)*, Oslo, The Ministry of Labour and Administration.
- Wiig, S. & Tharaldsen, J. E. 2012. In regulation we trust. *Work*, 41, 3043-3050.
- Wildavsky, A. 1988. *Searching for safety*, New Brunswick, N.J., Transaction Books.

Yin, R. K. 1994. *Case Study Research. Design and Methods*, Thousand Oaks, London og New Dehli, Sage Publications.