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'Culture' as a tool and stumbling block for learning: The function of 'culture' in communications from regulatory authorities in the Norwegian petroleum sector

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ABSTRACT

The 2001 HSE regulations for the Norwegian petroleum sector include a paragraph requiring the promotion of a sound health, safety and environment (HSE) culture. This paper presents an examination of the function of the 'culture' concept in communications from the regulatory authorities to the industry. We discuss implications for organisational and interorganisational learning for safety.

The regulatory authorities use 'HSE culture' in different ways depending on the document. No explicit definition of HSE culture is given in the regulations or the guidelines, whereas several diverging definitions are mentioned in an information pamphlet. In accident investigation reports, the HSE-culture concept has typically been used to characterise organisations with numerous violations of the HSE regulations or internal procedures. The concept has also been used to devise simplistic and possibly tautological explanations for frequent rule violations and to argue that numerous rule violations constituted a violation of the regulatory requirement to promote a sound HSE culture.

The plasticity of the 'HSE-culture' concept proved to be a two-edged sword. By introducing the HSE-culture concept in the framework regulation, the regulatory authorities explored an unconventional approach to HSE regulation. The 'HSE-culture' concept legitimated a very broad range of HSE approaches in regulated companies, some of which were unexpected by the regulatory authorities. In accident investigations, the use of the 'HSE-culture' concept in an explanatory capacity might lead to the premature closure of a search for the causes of an undesired behaviour or decision. The use of the term 'poor HSE culture' to explain or characterise extensive non-compliance in the investigation reports may have stimulated the regulated companies to prioritise HSE strategies and measures to enforce compliance.

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1. Introduction

1.1. Background

The concept of 'Health Safety and Environment (HSE) culture' was introduced in Norwegian petroleum regulations in 2001. The guidelines to this provision stated that 'A favourable health, environment and safety culture is also needed to ensure continual development and improvement of health environment and safety' (PSA, 2009, p. 18). This indicates that the Norwegian Petroleum Directorate (NPD) saw the provision as a means to facilitate organisational learning.

A year later, the petroleum authorities released an advisory booklet aimed to clarify the relationship between culture and HSE (Petroleum Safety Authority Norway, n.d.). The booklet underlined that the petroleum regulations are functional and, consequently, that it is up to each company to define what should constitute a 'sound HSE culture'. The relationships between HSE culture and learning were given broad attention. The culture concept was also used in some accident investigation reports issued by the regulatory authorities, the NPD, and, later, the Petroleum Safety Authority, Norway (PSA). The requirement to promote a sound HSE culture was retained in the 2011 version of the framework regulations, but the corresponding section of the guidelines was reformulated.

The regulation of culture in general and the specific efforts to regulate HSE culture in the Norwegian petroleum industry have been controversial. Karlsen and Valen (2011) suggested that the regulation of culture was a legislative statement that the

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Norwegian petroleum industry was to become a world leader with regard to HSE. They argued that the introduction of the concept in the framework regulation was more an instance of political rhetoric and ‘window dressing’ than a basis for real regulatory practice. Grote and Weichbrodt (2013, p. 225) argued that ‘[...] the inclusion of safety culture into regulatory requirements may have detrimental effects on the factual safety of high-risk organisations because by trying to understand and use the concept attention is pulled away from addressing more manifest safety issues’. Commenting on the Norwegian experience, LeCoze and Wüig (2013), among others, concluded that one of the difficulties in regulating safety culture originates in the many different meanings of the concept. They noted that some would argue that the Norwegian experience was a failure, as it did not achieve consensus among the regulatory inspectors and led to challenges in relation to the industry. However, they argued that introducing an ambiguous concept could also push companies to explore issues that would not be dealt with otherwise.

Kringen (2013, p. 220) noted that the Norwegian regulatory authorities ‘[...] had to confront a number of difficult tasks, making sense of the complexities of HSE culture, making it operational within the framework of their regulatory strategy, and simultaneously facing industrial initiatives, programmes and “cultural interpretations”’.

This paper presents a study of the functions of the ‘culture’ concept in communications from the regulatory authorities to the Norwegian petroleum industry. The *function* refers to what the ‘HSE-culture’ concept does in the text—what it achieves, triggers and performs. We discuss implications for organisational and interorganisational learning for safety. Such implications may stem from, for example, how the culture concept has been used to analyse accidents and from whether and how it has been used to justify formal sanctions in the aftermath of accidents.

The research is based on an assumption that the way the regulatory authorities use the concept of ‘culture’ in their communication with the industry may influence companies’ safety policies, strategies and measures. The study is a part of the research project *Translating HSE Culture in the petroleum industry* (TRACULT), which is designed to generate and disseminate knowledge on how regulatory authorities and companies might contribute to improving those aspects of HSE that are hard to explicate, measure and follow-up.

Our investigation is strictly bounded to a few documents and the usage of one concept in those documents. This form and focus has enabled us to unfold the meaning and function of both the concept and the specific contexts in which it functions. This limited body of documents can be used to illuminate issues concerning culture discourse, entification processes, safety production and questions of causality in investigations. These are issues, which, in their turn, may have an impact on organisational and interorganisational learning.

1.2. Culture controversies

The ‘culture’ concept has been discussed, defined and redefined so many times and in so many ways that it is difficult to present a coherent and precise synoptic of the different positions and their developments. Disciplines such as anthropology, psychology and engineering use the concept differently, but within those disciplines there have been debates related to what ‘culture’ refers to. Finally, the concept is often used as a matter of fact—without explicit definitions—by scientists and regulatory authorities, as well as in the media and everyday speech.

In organisational discourses, the concept of ‘culture’ is ambiguous and loosely defined. Though an anthropological concept of

‘culture’ is typically more comprehensive, safety culture research usually applies a more narrow conception.

Some fundamental differences and clear positions do exist. Of special interest to this case is the difference between culture articulated as object versus practice. In anthropology and philosophy, this difference is discussed as *variable versus metaphor* (e.g. Martin, 1992) correlating to neo-positivist versus interpretive perspectives. In an organisational context, the difference implies that culture is viewed as (1) something the organisation has and that can be managed (variable) versus (2) something the organisation is and that evolves by the practice of all members (metaphor). The typology provided by Allaire and Firsirotu (1984) differentiates between perspectives understanding culture as *ideational systems* and perspectives understanding culture as *sociocultural systems*. The core distinction in all typologies of culture is the difference between culture understood as an entity and culture understood as an indivisible whole.

1.3. From ‘safety culture’ to ‘HSE culture’

The investigation into the Chernobyl accident is ubiquitously cited as the origin of the concept of ‘safety culture’. However, the linking of the concepts of ‘culture’ and ‘safety’ can be traced at least back to Barry Turner’s seminal *Man-Made Disasters* (1978). Though he did not explicitly use the term ‘culture’, Turner pioneered the field of safety culture by studying how accidents could be the results of a form of ‘collective blindness’ shared by the members of an organisation. The relationships between safety culture and an organisation’s ability to identify safety problems, and then learn and improve from them, have been a prominent topic in discourse about safety culture (Westrum, 1993; Reason, 1997).

The interest in the relationship between culture and safety must be seen in association with a more general shift away from the assumption that individuals and organisations follow a strictly rational, intentional logic. Most organisational theorists now agree that shared beliefs and norms can provide quite specific rules for actions, thus forming ‘irrational’ foundations of organisational action (Brunsson, 1985). The interest in safety culture is also associated with the quest for more proactive approaches to safety management. While traditional measures of safety levels rest on retrospective data, such as LTI-rates and accident/incident records, knowledge about safety culture is thought, or at least hoped, to provide information that allows for safety improvements before accidents happen. Safety culture is often regarded as a subset of organisational culture that has consequences for HSE (see Hale, 2000; Guldenmund, 2000; Hopkins, 2006; Antonsen, 2009). As such, the concept is defined by its pragmatic effect.

In a widely cited definition from the Advisory Committee on the Safety of Nuclear Installation (ACSNI), safety culture is said to be ‘[...] the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation’s health and safety management’ (ACSNI, 1993, p. 23). Aspects of this definition have been retained in some PSA documents on HSE culture. Whereas safety culture is a recognised concept in international research literature, ‘health culture’ and ‘environment culture’ are not. This shows a skewed weighting on safety compared to health and environment. It also shows that certain cultural aspects are discussed and recognised differently in relation to the conceptual assembly of ‘HSE culture’.

The HSE work in the petroleum industry is shaped by the dominating accountability logic across industries today (see e.g. Power, 1997; Almklov and Antonsen, 2010; Hood, 2007). Within this logic, activities must produce measurable entities so that HSE is auditable. A typical tool to this end is the Key Performance Indicator. The key question for the HSE department

in an oil company would then be how to translate the desire to achieve a sound HSE culture into specific activities with clearly auditable goals.

Though it is clear that such translations will occur between a concept that is important but which fits poorly within the logic of regulation and organisational discourses, these dynamics and their consequences are poorly understood.

1.4. Research questions

We derived the following research questions from the overall issue concerning the function of the concept of ‘culture’ in written communications from the regulatory authority to the companies.

- A. What functions can we find for the ‘HSE-culture’ concept in the documents?
- B. To what extent did the regulatory authorities use the concept of ‘culture’ in a consistent manner across different contexts and text types?
- C. Is the use of the concept of ‘culture’ systematically related to the type of text (e.g. information leaflets versus accident investigation reports)?
- D. What are the implications for learning within companies and within the Norwegian petroleum sector?

2. Methods

2.1. Approach

Methodically, the study is grounded in the hermeneutical tradition and core analytical techniques inspired by critical discourse analysis (CDA). The hermeneutical tradition (i.e. the continual interpretation and reinterpretation of texts) would stress that (1) texts contain underlying meanings that (2) can be discovered by careful examinations of changes in meaning over time and for different subgroups of a society (Bernard, 2011, p. 17–18). The search for meanings and cultural interconnections requires, first, a close and stringent examination of the texts so that ‘[...] the symbolic referents emerge during the study of those expressions’ (Bernard, 2011, p. 475), and, second, relating the text to discursive and social practices, for instance through the use of CDA techniques (Fairclough, 1995; Jørgensen and Phillips, 2008). These techniques are appropriate to analyse investigations hermeneutically and are summarised by the following steps.

1. *Defining the corpus of texts:* As TRACULT is concerned with translations of § 15 and the concept of a ‘sound HSE culture’, a document was selected if it either discussed aspects of § 15 or the ‘HSE culture’ concept, used the ‘HSE culture’ concept or was considered to imply or presume the paragraph or the ‘HSE culture concept’ without explicitly mentioning them. Those documents referred to by informants were given extra attention, as it was of special interest to analyse documents that affect the understanding of ‘HSE culture’.
2. *Identifying potential themes:* The research group consisted of four researchers who read the texts and extracted topics of interest individually. They met regularly to compare and analyse those topics. The documents were analysed with regard to how the concept of ‘culture’ was used and its function in the text. By comparing the different definitions and functions, the themes of interest for this study were pinpointed.
3. *Analysing how categories are linked together:* In addition to comparing findings within documents, the findings were analysed as parts of the contextual whole. Important contextual aspects were the history of investigations in the petroleum industry and the Norwegian political landscape. For this part of the

analysis, other sources of information, such as the literature and interview study of TRACULT and research on public investigations, were used.

4. *Articulating hypotheses:* The articulation of hypotheses was part of the analysis process from the start. Some were rejected and others rearticulated, as the hermeneutic approach gave a more precise understanding of both the part and the whole.

We approached the empirical data by applying a semiotic perspective. This means that the word ‘culture’ was analysed as a sign with respect to its *use*, *function* and *meaning* within relevant documents. This analysis is based on the theoretical frameworks developed by Saussure (1974) and Peirce (1958). An important assumption for the analysis was a consideration of the relationship between signs (form) and the signified (meaning) as arbitrary. We also considered the sign as having a polysemic quality where the meaning was constituted in relation to the use. We started out with a syntactic analysis (i.e. the formal relationship of signs to one another apart from their external reference) followed by a semantic analysis (i.e. the relation between the signs and their reference and their possible referential meaning).

2.2. Corpus of texts

The empirical data in this study are texts related to the following categories of regulatory documents produced by governmental bodies: (1) regulations, (2) guidelines, (3) information pamphlets, (4) white papers and (5) accident investigations.

The development of the research questions and the sample of documents were based on six interviews with representatives from the PSA conducted in 2013. These informants included personnel involved in the development of the HSE culture paragraph in the framework regulations, information activities regarding HSE culture and accident investigations. The interviews were based on an interview guide comprising the following main themes.

- The background, intention and development of the HSE-culture regulation.
- The meaning of the concept ‘HSE culture’.
- How the PSA uses the HSE-culture regulation in their interaction with the industry.
- How the different companies have responded to the HSE-culture regulation.
- Views regarding the effects of the HSE-culture regulation.

The informants referred to different documents during the interviews. These documents represent the study sample. An overview of the documents is represented in Fig. 1.

The white paper ‘Principles for barrier management’ was included not because HSE culture is a prominent topic, but because it contains significant statements concerning the delimitation of the ‘HSE culture’ concept.

Our sample of documents does not mean that the PSA developed no other documents that could have been relevant for this analysis during the period. Therefore, our sample is limited to the documents the informants remembered and made relevant in the context of the interviews.

2.3. Interviews with representatives from PSA

Because interviews with six representatives from PSA informed the selection of texts and provided a background for our interpretations, some relevant results of these interviews are highlighted. In the interviews, the informants claimed that the intention of the new regulation was to ‘contribute to a more holistic view on HSE management’. They explained that the focus on HSE culture

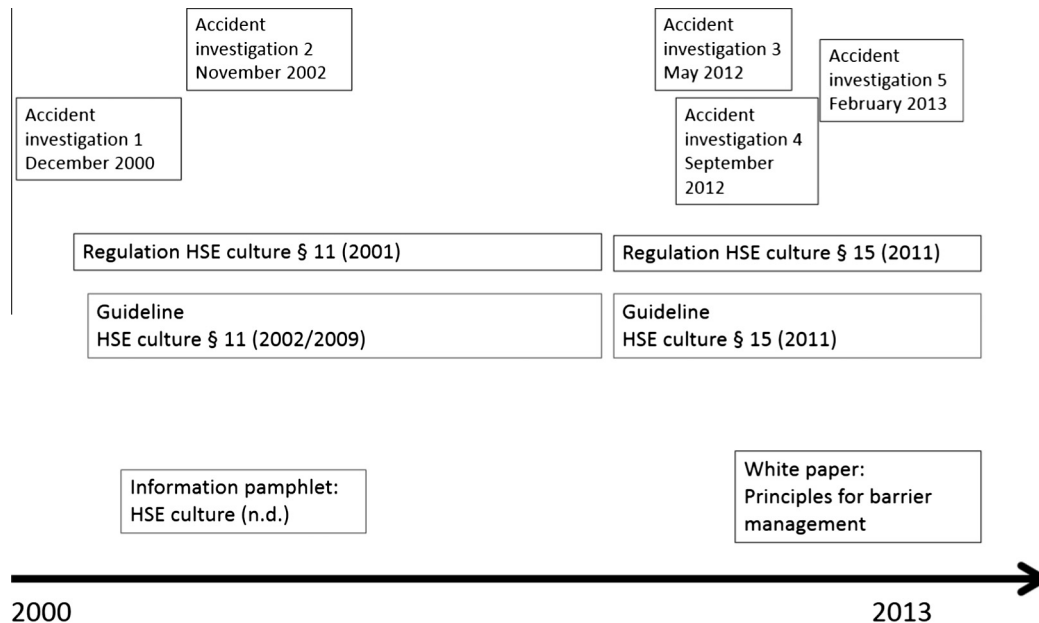


Fig. 1. Documents representing the sample in the study.

was motivated by a belief that the oil companies had to address and scrutinise conditions in their organisations that might contribute to HSE rather than focus on compliance with specific regulations, singular hazards and unwanted incidents.

The informants were asked why the term 'HSE culture' was used instead of the academically established and justified concept of 'safety culture'. None was sure about this. Some believed that it was a consequence of PSA-defined responsibilities. Since PSA is responsible for health and safety, it would be insufficient to use the prefix 'safety'. Some informants referred to an internal discourse within the PSA regarding concerns that safety received considerable attention at the expense of health and environment. Based on these answers, the construction of the concept of 'HSE culture' seems to have been founded on an internal discourse in the PSA regarding priorities of responsibilities and tasks rather than knowledge, arguments and research on the relationship between health, safety, environment and culture. The concept of 'HSE culture' was likely constituted to highlight all areas of the PSA's responsibilities rather than to point out its adequacy as an explanatory or analytical concept.

Some of the informants considered the HSE-culture regulations as mainly a 'communication paragraph', which they explicated as a regulation allowing the PSA to address certain topics towards the industry. They claimed that all activity and interaction between the PSA and the industry must be authorised by the regulations and that the HSE-culture regulation legitimised PSA's responsibility to address this issue.

According to the informants, the use of 'HSE culture' as a concept in accident investigations attracted great attention in the media; there were several reports in newspapers highlighting the poor HSE cultures of the involved companies. This was followed by a stock market decline for one of the companies. According to the informants, the PSA received criticism from the oil companies and trade unions for exaggerating the conditions. One informant claimed that the trade unions considered the PSA report as an insult to their members and that the reactions from the industry obscured the findings, thereby moving attention towards other matters. Based on the experiences from the first use of 'HSE culture' in accident investigations, the PSA decided to be very restrictive in its use of both the concept and the provision in future

investigations. The informants also said that the official concept had not been used since, but that investigation teams had used it as an analytical concept. The investigation teams had considered using the concept and the belonging paragraph in three recent investigations.

A common theme among the informants was surprise at the industry's response to the PSA requirements regarding HSE culture. One of the informants said, 'We were concerned about work environment and management, but companies focused on the individual and individual responsibility'. The informants claimed that the oil companies implemented different types of 'compliance programmes' oriented towards the attitudes and behaviours of individuals. According to the informants, culture was thus treated more as the employee's responsibility than it was a management issue. The informants claimed that the culture paragraph was changed in the next revision of the framework regulation due to the mismatch between the PSA intentions and the industry responses.

When commenting on the development of the information pamphlet 'HSE and Culture', some informants said they were somewhat dissatisfied with the result due to its lack of precision in describing and defining 'HSE culture'. Some said the lack was a deliberate decision and that it was used as a means to challenge the industry into research and learning processes. One informant claimed that the lack of precision was caused by the information department at the PSA in the completion of the text. The informant said that the precision was 'lost in the translation' from an expert language to a more popular one.

All informants claimed that the PSA's new concept and requirement regarding so-called 'barrier management' was partly based on their experience with the use of the concept of HSE culture in communication with the industry. The HSE culture was considered inherent in the PSA's focus on barrier management. Conditions related to 'framework' and 'management' (i.e. conditions the informants claimed were grasped and addressed through the concept of 'HSE culture') were integrated in the new barrier management concept and denoted as 'performance influencing factors'. Some of the informants said that the barrier management framework was easier for various industry actors to understand and adapt because it focuses on 'concrete requirements and expectations'.

The concepts gleaned from the interviews are summarised below:

1. The PSA introduced the ‘culture’ concept to promote awareness of the underlying conditions and systemic relations that contributed to the status of HSE work within the industry.
2. The concept of ‘HSE culture’ seems to have been founded on a collective request to highlight all areas of the PSA’s responsibilities rather than its adequacy as an explanatory or analytical concept.
3. The absence of a clear definition of culture was a deliberate measure to promote reflection and discussion within the industry.
4. Representatives from the PSA were surprised and disappointed by the industry’s response to the culture initiative and considered the oil companies’ measures as inconsistent with the PSA’s intentions.
5. Representatives from the PSA consider the new concept and requirement regarding so-called ‘barrier management’ a better conceptual framework than ‘HSE culture’ for promoting awareness of underlying conditions and systemic relations.

When they discussed how the different companies responded to the HSE culture regulation, some informants referred to the doctoral thesis of [Kringen \(2008\)](#), which addressed topics surrounding the background, development and use of the HSE culture regulation. Some of the statements seemed to echo the historical representation of Kringen; thus, we consider the interviews *interpretations of the past made in the present*.

3. Analysis and results

3.1. The framework regulation

HSE culture was introduced as a concept in Section 11 of the PSA framework regulation in August 2001 ([Petroleum Safety Authority Norway, 2001, p. 7](#)):

The party responsible shall encourage and promote a sound health, environment and safety culture comprising all activity areas and which contributes to achieving that everyone who takes part in petroleum activities takes on responsibility in relation to health, environment and safety, including also systematic development and improvement of health, environment and safety.

The terms used in the Norwegian version of the regulations do not have direct equivalents in the English version. For example, the word ‘sound’ in the English version is a translation of the Norwegian word ‘god’, which, like the English word ‘good’, forms the basis for a dichotomy between ‘good’ and ‘bad’. Using the word ‘sound’ avoids this dichotomy in the English version while suggesting a health metaphor (‘sound’ as a synonym to ‘healthy’) that is not apparent in the Norwegian version.

The above section uses the term ‘HSE culture’, but the concept is not defined. However, the formulation presumes that HSE culture is something the responsible party is able to promote and influence. Further, it is implied that a sound HSE culture will contribute to the ability of individuals to take responsibility for HSE, including developments and improvements. A sound HSE culture is assigned an instrumental function in this text; it is a means to achieve a specific objective (i.e. that everyone takes responsibility for HSE).

The text further implies two cause–effect relations: HSE culture influences behaviour (‘that everyone takes on responsibility [...]’), which in turn influences HSE.

A guideline for helping readers interpret the sections in the framework regulation was introduced in January 2002. The guiding

comments to § 11 are presented below ([Petroleum Safety Authority Norway, 2009, p. 18](#)).

This provision is new, but expresses principles embodied in the health, environment and safety legislation.

To ensure the success of the systematic effort needed to prevent faults and dangerous situations or undesired conditions arising or developing, and to limit pollution and injury to persons and damage to equipment, a favourable health, environment and safety culture must pervade all levels of the individual activity/establishment. A favourable health, environment and safety culture is also needed to ensure continual development and improvement of health, environment and safety.

In order to make it clear that this section applies across the entire scope of application of the regulations, the expression “health, environment and safety culture” is used instead of the more established term “safety culture”.

HSE culture is not formally defined in the guideline; however, it supports the interpretation that a sound HSE culture is conceived as a means to ensure the success of systematic HSE efforts. Some cause–effect relations are implied: A favourable HSE culture is depicted as a necessary condition for ensuring the success of systematic HSE efforts and continual development and improvement of HSE. The use of the juxtaposition ‘HSE culture’ instead of ‘safety culture’ is legitimised as an attempt to emphasise the concept’s validity throughout the scope of the regulations. The validity of the concept itself is not addressed.

A revision of the framework regulation was conducted in 2011. Requirements regarding HSE culture are addressed in paragraph 15 in the revised version ([Petroleum Safety Authority Norway, 2011, p. 7](#)):

‘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’.

HSE culture is still left undefined, and all involved parties are still required to have a sound HSE culture associated with all activities. What is new compared to the original version of the paragraph is that ‘[...] continued efforts to reduce risk and improve health, safety and environment’ is depicted as a means to build a sound HSE culture. In the 2001 framework regulation, the opposite means–ends relationship was implied; that is, HSE culture was depicted as a means to ensure that everyone takes responsibility for HSE. Because of this reversal, the HSE culture no longer has an instrumental function but is rather presented as a goal in its own right. Compared to the original provision, *the function of HSE culture has turned from being instrumental to normative and possibly also agenda-setting*.

A reading of the passage regarding HSE culture in the guideline ([Petroleum Safety Authority Norway, 2014, p. 21](#)) renders even more reasonable the idea that a sound HSE culture is a ‘required effect’:

A sound health, safety and environment culture can be observed in enterprises that organize continuous, critical and thorough work in order to reduce risk and improve health, safety and the environment. Elements of a sound health, safety and environment culture could thus be

- (a) that systematic, continuous and broad-spectrum monitoring and mapping methods are used as a basis for determined and managed prioritisation of efforts in the health, safety and environment work—based on the regulations’ principles of risk reduction and management,

- (b) that the effort and means in the health, safety and environment work are continuously subject to a critical assessment as regards potential goal conflicts and efficiency,
- (c) that there is a clear understanding in the organization that culture is not an individual quality, but something that is developed in the interaction between people and given framework conditions. Therefore, management responsibilities and behaviour will be key elements at all levels of the business,
- (d) that development and collective learning is facilitated through competence enhancement, participation and a systematic and critical reflection at all levels, and
- (e) that health, safety and environment work cannot be viewed independently from each other or from other value-creating processes in the enterprise.

The passage in the guideline appears as a list of specified features of the organisation that characterise a sound HSE culture. Culture appears not as a cause but as a descriptive concept that labels different hallmarks. A 'sound HSE culture' implies that the organisation has characteristics that are specified in the guideline. This reinforces our conclusion that the function of the paragraph is normative and agenda-setting.

Point (c) in the quotation above is the only statement in the reviewed documents that delimits the culture concept by stating that something (i.e. individual qualities) is *not* culture. Interestingly, this understanding is not presented in the form of a definition. Rather, it is suggested that an appropriate understanding of culture could be an element of a sound HSE culture.

3.2. The information pamphlet 'HSE and Culture'

An information pamphlet named 'HSE and Culture' (Petroleum Safety Authority Norway, n.d.) was issued by the PSA after the introduction of the HSE culture provision in the framework regulations. The document refers to the regulations of 2001 and the requirements regarding a sound HSE culture. It is stated in the beginning of the document that the regulations do not define what the HSE culture concept entails. The aim of the pamphlet is to provide 'approaches to understanding' of the concept of HSE culture, 'together with suggestions on how such a culture can be created'. However, it is emphasised that the brochure does not 'provide any hard-and-fast rules but is intended to assist the industry in improving its HSE culture'.

This introductory text is accompanied by a list of requirements for a sound HSE culture:

- *'Efforts to improve health, safety and environment are not viewed in isolation from each other'.*
- *'A good balance is maintained between the independent responsibility of each person in HSE work and the responsibility of the enterprise to provide good working conditions'.*

Important considerations for establishing a good HSE culture are said to include:

- *'Taking an integrated view of different HSE measures'.*
- *'Maintaining a systematic and critical focus on one's own HSE activities'.*
- *'Paying greater attention to the "H" and "E" components'.*
- *'Working continuously to improve the level of HSE, and not relying simply on spasmodic efforts'.*

In the introduction, the 'HSE-culture' concept thus has a normative and agenda-setting function that resembles its function in the 2011 version of the framework regulation.

There are several attempts to define 'culture' and 'HSE culture' throughout the manuscript. The second chapter reads, 'A culture can be defined as the knowledge, values, norms, ideas and attitudes that characterize a group of people'. In this definition, culture functions as a descriptive label, mainly referring to the individual characteristics (knowledge, values, norms, ideas and attitudes) of persons within a group. Culture seems to be conceived as an aggregate of individual properties rather than an emergent phenomenon that can only be understood or explained at the group level.

However, this definition is modified in the next section of the same chapter: 'Culture is not only a matter of knowledge, values and attitudes. It is also about technology, economics, law and regulation and other conditions that influence daily life'. This section explicitly states that 'culture' encompasses more than knowledge, values and attitudes, and thus seems to contradict the first definition. A causal or explanatory function of the culture concept is implied in stating that culture is about conditions that influence daily life. One interpretation of these additional sentences is that culture, considered as knowledge, values, norms, ideas and attitudes, is an effect of knowledge, values and attitudes. This circularity can be avoided through a reading of the two quotations as alternative and not fully compatible conceptions of culture. However, a statement on p. 6 suggests that the intention is to reconcile the two statements:

'Understanding how people's knowledge, values, norms ideas, attitudes and frame conditions interact is important in building HSE culture. All these aspects will influence the way we think and collaborate over HSE'.

The statement that 'culture is about technology [...] and other conditions that influence daily life' allows for very broad interpretations of culture; that is, it can be considered everything that influences daily life.

This section is followed one page later in the document with an analogy that introduces an epistemological perspective on culture: 'We can regard culture as a glass through which we see the world, and which helps us to interpret what we see'. The culture concept refers to epistemological conditions; i.e. it functions as a building block for account of the foundations, scope and validity of knowledge. This is followed by a relativistic turn, coining the concept of ethnocentrism, underlining that what is considered 'right' is relative and emphasising the importance of trying to understand why people think differently.

The introductory chapters about culture are followed by a chapter on the characteristics of a sound HSE culture. This description relies on James Reason (1997, 1998) and his qualification of a safety culture as one that is (1) a reporting culture, (2) a just culture, (3) a flexible culture and (4) a learning culture. The characteristics given by Reason function as labels denoting specified features of an organisation. These features are oriented towards abilities and qualities in terms of organisation performance, where the features are not nouns. At the same time, safety culture functions as a causal explanatory concept for good safety records. According to the culture taxonomy of Allaire and Firsirotu (1984), the characteristics given by Reason represent functions of a sociocultural system, where 'culture' functions as a descriptive of a specific system. This gives a concept that is tangent with the so-called classical functionalist school of anthropology where functions of a society, manifested in, for example, behaviour, are products of the entire sociocultural system, or simply 'culture' defined as 'everything is connected to everything'. 'HSE culture' becomes a descriptive of the whole that constitutes functions that promote good HSE records.

The rest of the pamphlet is oriented towards ways an organisation can work to establish a sound HSE culture. It does not give a recipe, but offers suggestions for how an organisation should plan

and develop measures to create a sound HSE culture. Meaning is also assigned to 'HSE culture' through 'check points' (i.e. discussion topics that operationalise aspect of HSE culture). A function of these discussion topics is apparently to influence the agenda for internal discussions within the companies.

The main message is that it is necessary to apply a holistic approach. This message is expressed in the concept of 'frame condition'. However, the holistic culture is operationalised and divided into numerous sets, including, for example, 'economical', 'enterprise', 'technology and knowledge' and 'workplace' factors. These factors are described to influence the HSE culture, and this creates a tautology where HSE culture (represented as operationalised factors) affects the (holistic) HSE culture.

In summary, our analysis of the manuscript shows that the term 'culture' may signify quite different concepts: at least (1) the products of the human mind, (2) the epistemology of the human mind or (3) a holistic sociocultural system. The prefix 'HSE' in the juxtaposition 'HSE culture' seems to signify the aspects of culture that affect HSE records.

3.3. White paper: Principles for barrier management in the petroleum industry

From 2011 to 2013, PSA developed several versions of the white paper 'Principles for barrier management in the petroleum industry'. However, we have not seen any difference in how the concept of 'culture' is used. According to PSA and the white papers, *'barrier management is about ensuring, on a systematic and continuous basis, that barriers are relevant, effective and robust'*. Key concepts in the barrier management are barrier functions, barrier elements, performance requirements and performance influencing factors.

Culture is not a central topic in the white paper, and the concept is not defined. However, culture is used as an example of so-called 'performance influencing factors' (i.e. *'Conditions which are significant for the ability of barrier functions and elements to perform as intended'*). Culture is considered one among several factors that influence the barrier elements (Petroleum Safety Authority Norway, 2013, p. 25):

Conditions such as workload, capacity, attitudes, culture and so forth among those involved in operating an installation, for example, could be very significant for the properties of the barriers when these are needed. That relates both to the way maintenance, testing and follow-up of technical barrier elements are conducted, and how effective operational and organizational barrier elements will be when required.

Thus, culture seems to be considered an independent entity, different from workload, capacity and attitudes. This usage seems incompatible with the holistic conception of culture advocated in the pamphlet 'HSE and Culture'.

3.4. Accident investigations

3.4.1. Accident investigation 1

The investigated accident occurred in December 2000. This means that the investigation was conducted before the implementation of the HSE-culture regulation. The investigation addresses a fatal accident related to a lifting operation on an offshore installation. It is an occupational accident represented and explained by rather linear causal chains. The term 'culture' is used twice in the report. The juxtaposition 'HSE culture' is not used. The adjectives 'good' and 'bad' are not used in relation to 'culture'. 'Culture' is used in the summary of the report in the following sentence: *'Observations indicate that a culture has been developed over time with an acceptance of violating basic principles of safe lifting*

operations'. In addition, the term is used in connection with the description of the operating conditions: *'The PSA got the impression that a culture has developed over time where it is accepted that there may be personnel within the lifting area, in some cases even under load'*. The use of the term 'culture' is not accompanied by a formal definition.

In expressions such as *'a culture with an acceptance'* and *'where it is accepted'*, the term 'culture' has a *descriptive* function; it aggregates different features related to the organisation. In this context, violations are among these features. A major part of the report addresses deviations from the regulations that were related to the course of events, but also violations that were not causally related to the accident. There seems to be an implicit assumption that these observed deviations are routine violations and established conventional practices, and not exceptional cases. This serves as an implicit argument that it is typical for this organisation to violate regulations and procedures.

The use of the term 'culture' indicates that the phenomenon was something that evolved and developed (i.e. *'culture has developed'*). By using the passive form, the report avoids pinpointing a specific actor as a causal agent behind this development.

The use of 'culture' in this document may also invite to conceive the concept as a *causal factor* (i.e. something that represents a cause and has an effect on something else). 'Culture' is not used to signify routine violations but appears as the inducer of the violations. This means that culture creates acceptance of certain patterns of actions. Conceiving 'culture' as a causal factor is a reasonable interpretation when taking into consideration that the scope of any accident investigation is to identify causes.

The presentation of observed violations not directly related to the specific accident also supports a specific understanding of culture as a causal factor. 'Culture' appears as the common cause of all routine violations. Conceptualising this common cause makes it relevant to address violations that are not related to the specific accident.

It thus seems that 'culture' is conceived both as a descriptive of specific features and as a causal factor. Mixing these concepts in a single argument may lead to a tautological relation where, for example, violations are caused by violations. If culture is conceived only as a causal factor, it still becomes a 'black box' that explains the employees' violations of regulations at the installation. The content of the 'black box' is dependent on the connotations the reader attaches to the term 'culture'. It may be filled with concepts such as 'shared attitudes' or 'the complex whole'. The use of 'culture' in relation to the term 'accepted' could invite an orientation towards shared individual beliefs and attitudes, unless 'accepted' is considered an anthropomorphism of complex wholes. Patterns of behaviour in the organisations seem to be caused by 'someone's' acceptance. The use of 'accepted' implies also that something is not accepted. If we conceive culture as shared beliefs among individuals, the use of 'accepted' may create the impression that violations are caused by 'someone's' or 'some things's' knowledge and tacit or explicit approval.

Based on the report, a possible conclusion is that there is something wrong with the culture. According to the interviews, this accident report received great attention in the media, where the representation was oriented towards the culture of the installation and the oil company as a whole. According to the informants, this made it appear that the oil company had an inherently 'bad culture', and the PSA received criticism from the company and trade unions. The informants claimed that the reactions on the report were not constructive towards solving the problems.

3.4.2. Accident investigation 2

This accident occurred in November 2002, after the inclusion of the new HSE-culture paragraph in the PSA's framework

regulations. The investigation addresses a fatal accident related to a lifting operation on an offshore installation, where a worker was crushed between two containers. The term 'HSE culture' is used in the report several times, but it is not formally defined. 'HSE culture' is introduced in the summary of the report in the following sentence: *'Many collective violations of procedures and inadequate reports are an indication of a poor HSE culture'*.

The attention is directed towards collective violations of procedures. The concept is described in the reports as *'several people together violate procedures, or tacitly accept that others violate procedures without intervention'*. Collective violations and inadequate incident reports are considered indications of 'poor HSE culture'.

The following section of the report establishes that procedural violations were common in the organisations involved and that the managers were aware of this:

[The investigation] revealed serious failures in the management of [name of the oil company]. The company had identified the hazards that the relevant staff had insufficient knowledge of lifting procedures and they were aware that procedural violations were a problem. However, no measures were implemented in order to follow this up.

'HSE culture' seems to be used as one among several causes behind procedural violations. The causes behind the procedural violations are listed as follows.

The investigation has revealed the following causes of procedural violations:

- *Inadequate training/knowledge of the procedural requirements for working personnel.*
- *Inadequate reporting.*
- *Inadequate monitoring/control of line managers with overall responsibility for deck personnel and crane operators.*
- *Deficiencies in procedures.*
- *Different practices.*
- *HSE culture.*

The representation of causes may be interpreted as a conceptualisation of discrete entities. It is unclear whether 'HSE culture' signifies a concept of which the other identified causes in the list are a part. With reference to [Russel and Whitehead \(1913\)](#) and their conceptualisation of logical types, the representation gives the impression that the other listed causes should not be considered as a part of 'HSE culture'.

The consideration of HSE culture is also treated in a separate section in the report titled 'HSE culture': *'The above-mentioned observations that are made regarding the extent of procedural violations, collective procedural violations, inadequate monitoring offshore, and inadequate follow-up from land organisation of identified risks indicate a poor safety culture. This is a violation of the Framework Regulation § 11 on sound health, safety and environment culture'*.

Considering the argumentation as a syllogism, the tacit major premise seems to be that, if the 'HSE culture' is poor, then the organisation will be characterised by frequent collective procedural violations with inadequate monitoring offshore and inadequate follow-up from the land organisation. The minor premise is that the organisation has these characteristics, and the conclusion is that the organisation has a poor HSE 'culture'. The argumentation gives an impression of a universal affirmative even though this syllogism is to be considered as invalid, representing a propositional fallacy.¹ However, since poor HSE culture is established as fact, it

is possible to claim that this is a violation of the Framework Regulation's § 11, which requires a sound HSE culture.

3.4.3. Accident investigation 3, 2012

The culture concept is not used in this report; however, the informants from the PSA said the investigation team considered using the concept and referring to the framework regulations in the report. The investigation addresses a hydrocarbon leakage.

A central concept used in this report is 'performance influencing factors'. The concept is not formally defined in the report but is conceptualised as factors that influence the state of the 'barriers' and their abilities to function. The report uses a barrier taxonomy, which corresponds to the taxonomy presented in the white paper on barrier management (Section 3.3). The 'performance influencing factors' are central in the report's conclusion: *'Based on observations and arguments [...] it is our opinion that weakened performance influencing factors [...] represents the most significant underlying causes that have contributed to the incident to occur'*.

The conclusion is based on a set of observations. The major observations are presented in this passage:

PSA has investigated the incident and the observations of the greatest importance for the event are:

- *Inadequate design solution.*
- *Inadequate design solution was not identified.*
- *Inadequate descriptions of how work should be performed.*
- *Weaknesses of the group's document management.*
- *Weaknesses in risk assessment in planning.*
- *Weaknesses in the competence and understanding of risk.*

In addition, it was found weaknesses in experience and learning [...] from past events.

These observations and several others are treated as performance influencing factors in another section of the document and are categorised according to their influences on technical, operational and organisational barrier elements.

3.4.4. Accident investigation 4, 2012

Informants from the PSA claimed that the use of the concept of 'HSE culture' was considered relevant among the investigation team participants. This investigation addresses a near accident related to ballast and the stability of an installation.

In the report, the term 'culture' is used once and in relation to the summary of root causes to the event:

The investigation does not conclude as to whether inadequate decision-making in connection with this incident represents a single case of non-compliance or whether it constitutes an indication of major organizational weaknesses. However, we have identified inadequate processes and inadequate managerial priorities in several areas at different levels and in different phases. This may indicate that the company faces challenges with its overarching culture of compliance and with evaluating the impact that different management decisions have risk on board.

The function of 'culture' in this passage is ambiguous. It is not clear whether the term is used to characterise the organisation or to create a causal account.

3.4.5. Accident investigation 5, 2013

Neither the term 'culture' nor 'HSE culture' is used in the report. Informants from the PSA investigation team said they considered using the 'HSE-culture' concept. This investigation also addresses a near accident related to ballast and the stability of an installation.

The summary of the investigation report contains a passage pointing to organisational deficiencies without relating them to

¹ The argument represents a formal fallacy. The argument has the following general form: (1) If A, then B (2) B (3) therefore A. Here, A = 'the HSE culture is poor', B = 'the organisation is characterised by collective violations, etc'. This form of argument is invalid because the conclusion can be false even when statements 1 and 2 are true.

the organisation's culture or HSE culture: 'A general deficiency was lack of collaboration and understanding of various actors' qualifications in relation to design, construction and operation of the facility'.

A new company on the Norwegian continental shelf was involved in this incident. This condition is emphasised in the report:

[Name of the company] is a new player on the Norwegian continental shelf with only [Name of the facility] as a subject to Norwegian legislation. Since [Name of the facility] came into use [in May 2011], the PSA has been notified of seven unwanted incidents at the facility.

This section may function as an *enthymeme* (i.e. it may lead to an unstated conclusion). In this case, it could be that new players on the Norwegian continental shelf may not be familiar with Norwegian legislation and thus be at greater risk of unwanted incidents. Although the term 'culture' is not used, the focus on the nationality of the operator and the lack of familiarity with Norwegian convention and legislation gives an impression that the observations may be consequences of different national cultures; that is, consequences of non-Norwegian companies doing things differently.

4. Discussion: the functions of 'culture'

4.1. The functions of 'culture'

The main results of this study can be summarised in the following way.

- With the exception of the information pamphlet 'HSE and Culture', the term 'HSE culture' is not formally defined in the written communications from the NPD and PSA to the industry.
- The pamphlet 'HSE and Culture' contains divergent formal definitions of 'culture' and 'HSE culture'. The definitions refer to general definitions of 'culture' or 'safety culture'.
- The function of the term 'HSE culture' in the original framework regulation is instrumental. A means–ends connection from culture to behaviour and the state of the HSE is implied.
- The function of the term 'HSE culture' in the revised framework regulation is normative and agenda-setting. The term signifies a set of specified characteristics of the organisations that are assumingly correlated with the HSE. A good HSE culture seems to be the result of conscious efforts and measures taken by the management.
- The terms 'culture' and 'HSE culture' seem to function as a descriptive concept in some of the investigation reports and as an explanatory construct in others. In some of the reports, the terms function as both a descriptive and causal factor, thus creating a tautological relation. In one accident investigation report, the HSE-culture concept is used to build an argument that the framework regulations had been violated (juridical function). This argument could then be used as a justification for imposing sanctions on the company involved.

With reference to the research questions in Section 1.4, we may conclude that the concepts of 'culture' and 'HSE culture' have several different functions in the texts studied. In the next paragraph, we argue that there are significant tensions between the ways these concepts are used in different documents and within documents. The use of the 'culture' concept seems to be related to the type of text. The concept is used in instrumental, normative or agenda-setting functions in the regulations, guidelines and the information pamphlet, whereas it is used to construct causal accounts, to characterise organisations with frequent rule violations and to justify sanctions in the accident investigations.

There appears to be an asymmetry between the expression 'poor HSE culture', as used in some accident investigations, and the expression 'sound HSE culture', as used in the information pamphlet and in the revised guidelines. Whereas 'poor HSE culture' is typically used in conjunction with frequent rule violations, 'sound HSE culture' is used more holistically to characterise the ways the organisations handle HSE issues (e.g. 'a learning culture' or 'a just culture'). This asymmetry may be related to the context and type of text. A narrow focus on violations may be sufficient to justify sanctions against a company but not to convey a nuanced understanding of the 'HSE-culture' concept.

4.2. The plasticity of 'culture' in communications from the regulatory authorities to the industry

We found explicit definitions of 'HSE culture' in only one document, the pamphlet 'HSE and Culture'. This document presented or implied divergent definitions of 'culture'. In Fig. 2, we have extended the typology of Allaire and Firsirotu (1984) by introducing a distinction between the holistic system and the product of the holistic system. As shown in Fig. 2 in the pamphlet, the referent of 'culture' can be recognised as all subsets of this extended typology:

Although the pamphlet employs divergent conceptions of 'culture' or 'HSE culture', this divergence is not thematised. It is left to the reader to detect tensions between the conceptions of 'culture' that are presented or implied and to decide what to do about these tensions. The approach to culture in the pamphlet is thus highly eclectic, combining bits and pieces from various sources with little concern for incompatibilities or contradictions. There are also no attempts to delimit 'culture' by stating what culture is not or by identifying contexts where it would be inappropriate to use culture as an explanatory construct.

These observations also apply to the other documents reviewed in this study, with one exception. The guidelines to the revised framework regulation state that one element of a sound HSE culture is an understanding that culture is not an individual quality. The following passage from the information pamphlet 'HSE and Culture' (p. 5) provides a rationale behind the absence of rigorous delimitations of 'HSE culture':

Requirements in the HSE regulations for the Norwegian continental shelf (NCS) are largely formulated in functional terms. If no recommendations are provided on how these requirements should be met, it is up to each enterprise to set their own standards for meeting them – specifying what constitutes a sound HSE culture, for instance.

[p. 5]

This rationale empowers enterprises to develop their own understandings of 'HSE culture' and may thus provide legal protection against a situation where the enterprises could be sanctioned for not complying with an ill-defined regulatory requirement.

It is outside the scope of this study to explore whether other causes or considerations may have contributed to the absence of formal definitions or delimitations of HSE culture or to the divergent usage of the concept in the regulator's communication with the industry. There are several relevant factors, such as the absence of consensus on the meaning of culture, safety culture or HSE culture in the research community; political convenience (e.g. avoiding time-consuming controversies within NPD and PSA and between the regulator and the industry); or that different people with diverse perspectives on HSE were involved in the production and use of these documents.

Although NPD and PSA used the concepts of 'culture' and 'HSE culture' in divergent ways, some usages are *not* present. Culture was not explicitly used to build hermeneutic accounts of human

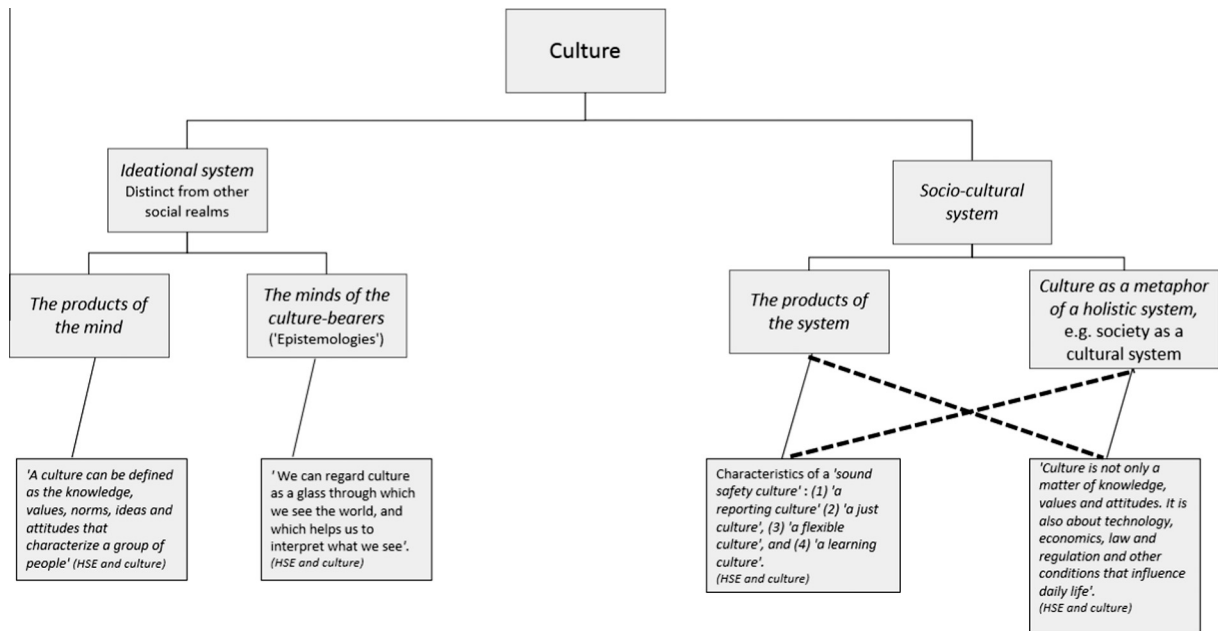


Fig. 2. Typology of culture.

actions (e.g. by explicating the actors' interpretations of the situation when an accident occurred or the meaning of their own and other's actions). Neither was culture conceived as a relatively stable and immutable constraint to which other elements of HSE management should be adapted.

There is a potential for gaining new knowledge by conducting cultural analysis of symbolic systems to understand how people make sense out of 'daily life' in their organisation. This represents an interpretative approach where the objective is to grasp the insider's point of view or, as stated by Geertz (1993, p. 58), '[...] to figure out what the devil they think they are up to'. The interpretative approach may be used to explore, for example, why people violate procedures in a specific organisation. This calls for a subjective approach or what Dekker (2006, p. 38) frames as '[...] unfolding the world from the point of inside the situation'.

To summarise, the concepts of culture and HSE culture as presented and used by the NPD and PSA are extremely plastic. The usage accommodates significant tensions without thematising these tensions. This raises a question about the implications of this plasticity for learning within companies and within the Norwegian petroleum sector.

4.3. The logic of 'culture' in accident investigations

'Culture' has been used, for example, in political discourse to legitimate certain activities ('it is their culture') or to stigmatise populations ('their culture is so and so'). Others use 'culture' as an identity marker, claiming rights on behalf of a specific culture. To be used in such a way, social phenomena must be objectified, separated from other phenomena and related as either cause or effect in the discourse of explanations (Røyrvik, 2012, p. 203). This is the core and mandate of formal investigations.² In this case, we can identify the objectification process of the 'culture' concept by how it is delimited (in different ways) and used (differently) to explain accidents.

² Explanation is always twofold. It accounts for an unknown by means of a known while verifying that known by means of the unknown. Explanation takes place in investigation (Heidegger, 1977, p. 121).

While controversies surrounding the concept of 'culture' typically are related to either what 'culture' refers to or how 'culture' is used, in this case, 'HSE culture' has different referents and holds different accentuations in the contexts of the various investigations. In the documents we studied, culture and HSE culture are introduced as entities in the realm of explanations. By the use of 'culture' in investigations, this entity is articulated by a causal relationship to other entities defined by the context of explanations.

Since the term 'culture' is used to signify rather different concepts, the term should be considered polysemic. Polysemic words used in the same argument may result in an equivocation and logical fallacy. 'Culture' signifies products of human minds but also the process of the human mind. This implies that culture (sociocultural system) influences culture (process of human mind), which influences culture (products of human mind).

When 'culture' is used to explain accidents, it is entified (Larsen, 2009) and causally related to other entities, often treated as a factor in an explanation. Investigation 3 is a classic explanation of an accident where factors are supposed to affect a barrier, thereby allowing accidents to happen. Interestingly, in this case, the investigators considered including culture in their explanation for the failure of barriers but instead selected 'weakened performance influencing factors' as the cause of the accident. In earlier investigations of similar incidents, culture was considered a cause, and informants said it was also considered a cause in this case, but too problematic to use. When compared with the explanation of investigation 2, where culture is included as a factor among other factors, it is evident that culture as a factor/cause is a matter of interpretation and choice, which is in direct contradiction to the kind of cause³ it is articulated to be in the investigations.

The use of culture as a factor/cause can lead to logical errors. As shown in Section 3.4.2, culture is treated as a factor among other factors and as a factor that includes its own subset. In this case, the plasticity of 'culture' seems to both produce and hide the logical inconsistencies (see Fig. 3).

Investigations 1 and 2 might include hidden tautologies. Culture is treated explicitly as a cause and an effect of that cause. Again, the invalid inference seems to be hidden as not only the

³ Causa efficiens in the Aristotle-Heidegger typology (Røyrvik, 2012).

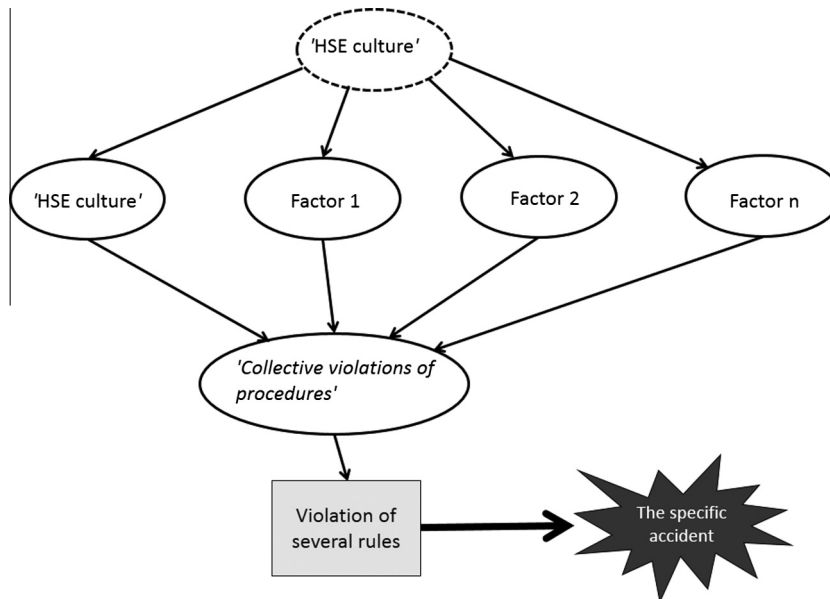


Fig. 3. Investigation 2-culture and its causes.

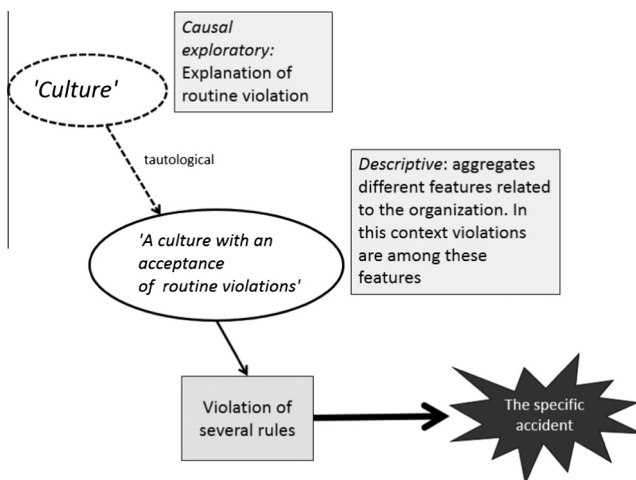


Fig. 4. Investigation 1-culture and its causes.

referent changes, but also the accentuation of the concept, which is schematically re-represented in Fig. 4.

When these explanations based on different understandings and usages are held together, it is evident that the conclusions are problematic. The concept of culture functions as a cause and effect in the causal explanations of public investigations. Those conclusions might therefore be considered tautological. However, the tautology is hidden, as the usage of 'culture' is in accordance with how the concept is explained by government documents and the varied usage of culture in literature.

A common hallmark of the first investigations where 'HSE culture' or 'culture' is used (investigations 1 and 2) is that they both address lack of compliance with procedures or 'collective violations of procedures'. Regardless of whether this may be attributed to culture, the lack of rule compliance is pointed out as the problem. On this basis, it is not surprising that the oil companies implemented various forms of compliance programmes as a response to HSE-culture regulation. Most companies adapted different methods of so-called behaviour-based safety into their organisations (see e.g. Tharaldsen and Haukelid, 2009) and did not use resources to explore the relationship between safety (and health and environment) and different organisational factors.

4.4. 'HSE culture' versus 'safety culture'

The pamphlet on HSE culture explicitly called for a greater focus on the 'H' and 'E' of HSE. We are not in a position to determine to what extent the regulatory authorities lived up to this intention in their communications with the industry. Our corpus of texts was not selected to be statistically representative, and it may be biased towards accident investigations (the 'S' of HSE).

Even when allowing for this bias, we noted few if any statements where the regulatory authorities explicitly link health or environment issues to HSE culture. This could be because such links lacked precedence in the academic literature. It could also be due to the anomalous nature of accidents; by definition, an accident should not occur and it is thus subject to explanations. Accidents are also events clearly delimited in both space and time and, consequently, can be metaphysically separated from safety culture as a sequential cause.⁴

HSE is an assembly of areas of interest and regulation, each with their own discourses related to contexts, explanatory models and research traditions. Interviewees who participated in creating and introducing the concept of HSE culture explained that the pragmatism behind the assembly of the 'H', 'S' and 'E' and the reason they are compiled into one concept is that 'PSA decided to do so'. The limited attempts to conceptualise HSE culture rely mainly on references to academic works regarding culture in general and definitions of 'safety culture'. There is no argument justifying the concepts of 'health', 'safety', 'environment' and 'culture' as interrelated. This political decision may have had limited impact because there were no obvious 'slots' in the existing discourses on health and environment wherein the new concept would fit.

5. Conclusions: Implications for learning within companies and the petroleum sector

Introducing the 'HSE-culture' concept into the regulations created, at least in principle, several opportunities. New issues and perspectives could enter the agenda, both within the companies and contractor hierarchies and in the interactions between the

⁴ For example, this is evident in the causal investigation model ISCL (Rosness et al., 2010).

industry and the regulatory authorities. The companies were encouraged to take a holistic approach to HSE work rather than take a narrow focus on compliance with detailed requirements. The open-ended approach to HSE culture also, in principle, left considerable scope for the companies to innovate and devise solutions adapted to local conditions.

Our results indicate that the introduction of the 'HSE-culture' concept in the regulations also created significant challenges. These challenges are highly related to the plasticity or polysemy of the 'culture' concept. The NPD and PSA did not achieve a high degree of consistency in their own usage of the concept. The introduction of 'culture' in the regulators' accident investigations did not lead to a more holistic perspective or more attention to environmental conditions, such as technology, economics, law and regulations. Rather, due to its plasticity, the culture concept was assimilated to the prevalent logic of regulatory investigation, including its focus on the identification of regulatory requirement violations. When used in accident investigations, the culture concept lent itself to the construction of circular explanations. We also noted a tendency to accept culture as a root cause and thus close the search for underlying causes prematurely. Negative characteristics of a company's culture could lead to negative media attention and considerable strains on the individuals and organisations involved. This may have led to a paradoxical effect: Because the accident investigations linked culture to rule violations, the regulatory authorities may have reinforced tendencies in the industry to link 'culture' to individual compliance and to respond by implementing programmes to reinforce individual compliance. Behaviour-based safety programmes focusing on individual compliance with rules was not an adequate measure to handle the HSE culture. The ambition of the PSA to stimulate to a generative learning process within the industry thus did not meet its expectations. In these cases, the 'culture' concept can be viewed as a stumbling block for learning, both within the regulated company and in the interactions between the company and the regulator.

At the same time, some of the potential related to the 'culture' concept remains unexploited. The 'culture' concept was not used to build hermeneutic accounts of human action. The perspective that HSE management systems and practices should be adapted to the local culture also appears to be absent in the documents studied.

Several contextual factors should be taken into account when interpreting the results from the present study. These are mainly related to the regulatory regime and its environment in the Norwegian offshore sector (Lindøe et al., 2014). The regulatory authorities possess considerable informal power through their influence on the distribution of future licenses for petroleum exploration. There is a strong tradition for tripartite collaboration between regulatory authorities, industry and trade unions (Rosness and Forseth, 2014). There is also a strong tradition for function-oriented HSE regulation. When HSE culture was introduced in the framework regulations, the oil companies and the major contractors operating on the Norwegian shelf had considerable resources to handle functional requirements, which required some interpretation efforts by the regulated companies.

What can regulatory authorities learn from the findings in this study? This may be highly context dependent. The tolerance for ambiguous regulatory requirements, for instance, may be very different in various regulatory environments. However, we believe that the following recommendations are relevant across a broad range of regulatory contexts.

1. To exploit the potential for enhancing organisational learning related to HSE culture, regulatory authorities must devise new strategies for accident investigation and promotion of organisational learning. A problem with the investigation reports we studied was that the analyses were dominated by a rather

narrow interest in identifying violations of laws and regulations. New strategies for accident investigation should promote alternative perspectives, such as organisational information handling or the handling of conflicting goals.

2. It is necessary to separate control-and-compliance logic and learning logic. This may imply an organisational separation of (1) accident investigations that aim to identify and sanction violations of laws and regulations, and (2) accident investigations that aim to promote learning within the industry. Such a separation has been institutionalised in the Norwegian transportations sector. Here, the first function is carried out by the police, and the second function is carried out by an independent accident investigation board.
3. It is also necessary go beyond 'poor HSE culture' when explaining accidents. This could involve seeking specific explanations for rule violations (e.g. in terms of dilemmas facing operators, quality and availability of procedures and quality of supervision or operator training). It may prove productive to exclude the notion of 'HSE culture' from accident investigations to achieve this.

Despite this, we conclude that the 'culture' concept may carry potential for improving learning within and between organisations. To exploit this potential, one must embrace those aspects of culture that set it apart from conventional safety management perspectives, such as a holistic perspective, an emphasis on understanding rather than explanation, a recognition of culture as something not easily controlled or manipulated, and a recognition of the infeasibility of building a homogenous culture in a complex organisation. Thus, there is a limit to how eclectic and diplomatic one can be about the 'culture' concept without reducing its potential as a tool for improved safety work. This may pose a dilemma for regulatory authorities who do not want to be too prescriptive in their requirements of the industry and who want to leave the industry a broad scope for innovation.

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