

REDUCING THE GAP BETWEEN PROCEDURES AND PRACTICE – LESSONS FROM A SUCCESSFUL SAFETY INTERVENTION

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Abstract - Formal work procedures are central parts of an organization's safety management system. However, there always seem to be some discrepancy between work as prescribed in procedures, and the way work is actually carried out. Although it is neither possible nor desirable to eliminate this discrepancy completely, too large a gap represents a problem for safety management. Furthermore, it is a problem to which traditional approaches to safety management have found no solution. In this paper we present an empirical analysis which highlights some fundamental conditions that facilitate compliance: by keeping procedures few and simple and, more importantly, by emphasizing broad and direct worker participation in the process of implementing the procedures, a greater level of commitment and adherence to procedures was achieved. It is proposed that addressing the gap between 'work as imagined' and 'work as actually done' can serve as an opportunity for building organizational resilience through organizational learning.

Keywords: Safety management, resilience, work procedures, organizational learning, safety culture

1. INTRODUCTION

Most accident investigations uncover violations of procedures, rules or regulations that in some way contributed to the accident: There is always someone who 'doesn't do what they are supposed to do' (cf. Hopkins 2000). Quite often the workers violating procedures are seen as the culprits causing the accident. This view rests on an assumption that complex systems are basically safe, but that system defences are undermined by the unreliable actions of humans. Most safety researchers are now moving away from this view of safety (e.g. Rasmussen 1997; Hollnagel et al. 2006). Safety is no longer seen as something which is achieved by reducing the leverage of the human contribution. Safety is created *through* human practice, not *in spite* of human practice (Dekker 2006a). We agree with this view on the role of human action in creating safety. However, acknowledging the role of human action and creativity in creating safety does not suspend the need for formal procedures. In systems characterized by a high degree of complexity, i.e. with a tightly coupled technology, where several high risk work processes are performed simultaneously, and where the activity of several organizational units must be coordinated, there will still be a need for formal procedures. Thus, the problem of procedural violation still needs to be addressed.

In this paper we wish to address the problem of procedural violations from a new angle by focusing on *compliance* rather than violations to procedures. We wish to shed light on the conditions that can facilitate the balancing between work as designed in formal procedures, and the way work is actually carried out in normal operations. This is done on the basis of an evaluation study of a change process which aimed at improving the use of procedures on Norwegian offshore supply bases. Evaluating the effects of safety interventions is an important task of safety research, since it can yield information about the usefulness of different intervention strategies

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(Shannon et al 1999). This paper aims to extract some success criteria from a major revision of the procedures governing work on the offshore supply bases.

2. THEORETICAL BACKGROUND

Work procedures are part of all organizational design. In organizations dealing with high risk, operating procedures are important parts of the systems design to control risk. Lind (1979, in Dien 1998: 181) defines procedures in the following way:

In general, a procedure is a set of rules (an algorithm) which is used to control operator activity in a certain task. Thus, an operating procedure describes how actions on the plant (...) should be made if a certain system goal is to be accomplished

According to this definition, procedures are protective mechanisms against human error. In addition to this control aspect, other functions, such as coordinating between tasks and the accumulation and diffusion of organizational experience, could also be included. Also, procedures have a legal function in fixing responsibility: Workers have a responsibility to perform tasks in a way that does not jeopardize safety. If procedures are deliberately violated, this may, in some instances, imply negligence which, in turn, may involve legal liability.

It follows from this that safety procedures are the very backbone of safety management systems. In fact, all safety management systems are based on the assumption that people will follow the procedures most of the time (Hudson et al. n.d.). If this assumption is broken, there is very little value in having procedural systems at all. Thus, there should be no doubt that employees' use of and adherence to procedures is of critical importance to the study of organizational safety.

Despite this, there is surprisingly little research on the topic. Some researchers have analysed the reasons why employees violate procedures (e.g. Reason 1990; Mason 1997; Lawton 1998; Hopkins 2000; Hudson et al. n.d.; Karwal et al. 2000), but there are few attempts to propose solutions to this problem (e.g. Hale 1990; Bax et al. 1998; Dien 1998; Laurence 2005). The research on the topic is also quite fragmented which is probably why Hale and colleagues (2003) summarize the research on safety procedures in the following way:

The cry is for better rule use and management, but there are still not very clear ideas of how and of how to avoid the many pitfalls in producing workable safety rules
(Hale et al. 2003:2)

The discrepancy between the work practice prescribed through safety procedures and the way work is actually carried out should not come as a surprise to anyone. Sociological studies of work very often reveal that workers tend to create their own informal work procedures that can be very different from formal procedures (e.g. Gouldner 1954; Crozier 1964; Suchman 1987). The existence of informal procedures that guide decisions and actions are a central part of the popular definition of organizational culture as 'the way we do things around here'. Therefore, asserting that workers sometimes violate formal procedures by following their own improvised procedures is by no means a novel statement. The pivotal question is 'what can be done to avoid it?'

2.1` Formal procedures and informal work systems

The reasons underlying procedural violations are many and complex (Reason 1990). However, both researchers and safety managers have a tendency to focus on the individual aspects of violations, such as employees' attitudes, commitment and competence. Helmreich's (2000: 746) view on error as a 'result from physiological and psychological limitations of humans' is one example of this. Although he recognizes the role of contextual factors such as workload and 'flawed decision making', the emphasis remains on the individual worker and their limitations.

Such views rest on the assumption that total safety will be achieved if workers comply with rules at all times. This is a simplification of a multifaceted problem, which is symptomatic of bureaucratic, top-down approaches to safety management. One of the most far-reaching consequences of such rationalistic approaches is that planning and pre-programming are separated from the people performing the work (Morgan 1986). Procedures are developed solely by experts who are not involved at the operational level, with few real options for worker participation or feedback on the usefulness of the procedures. Very often, this leads to a gap between 'work as imagined' and 'work as actually done' (Dekker 2006b: 86), as procedures produced from afar are less able to cope with challenges and unforeseen events.

This is the starting point of the creation of informal work systems. Once established, informal work systems involve an erosion of control which, in turn, can lead the organization into a practical drift (Snook 2000) towards the boundaries of safe practice. Moreover, the development of informal work systems often involves a cultural differentiation of the organization in question. Lysgaard (2001) for instance, observed that the industrial organizations he studied in the 1960s were characterized by a marked division between the operative workers and the administrative staff. The shop floor workers drew a cultural line between ‘us’ (workers) and ‘them’ (office employees). According to Lysgaard, the workers’ collective functioned as a buffer to the demands of a rigid bureaucratic system. In another classical study in the sociology of the subordinate, Crozier (1964) shows how workers’ collectives may be a medium for resistance towards organizations’ control systems. Both these studies, although conducted half a century ago, contain important information for those studying the relationship between procedures and practice. The friction between the workers’ collective, on the one hand, and the technical/economical system, on the other hand, is an important factor in understanding the degree of commitment to an organization’s safety management system, and also how safety interventions can be successfully implemented.

2.2 Writing another procedure

The body of procedures regulating an area of work sometimes appear as a ‘jungle’ of procedures. In complex workplaces, procedures may be in conflict with other procedures, both within the company’s own system and also with the procedures of contractors. The sheer number of procedures may thus constitute a barrier towards their use. A safety manager we had previously interviewed illustrated this when he complained that: ‘we have the best procedures in the world – the problem is that no one uses them!’

There are several mechanisms that contribute to a steady growth in the number of procedures. One is the complexity of work. The attempts to make the procedures as realistic as possible may serve as a major cause for an ever-increasing number of procedures. Also, there are institutional mechanisms that contribute to the generation of new procedures. In the aftermath of accidents and incidents, regulatory authorities usually demand some kind of action to be taken to prevent similar incidents happening again. Creating new procedures is a common and highly visible way of satisfying such demands. This is tantamount to saying that safety management systems have a tendency to become so-called *loosely coupled systems* (March et al. 1976; Meyer & Rowan 1977). In a loosely coupled system, the formal organizational structures (such as rules and procedures) do not arise from the demands of the concrete work activities. Instead, they reflect ‘the myths of their institutional environments’ (Meyer & Rowan 1977: 341). This means that new procedures are generated on the basis of influence from forces outside the organization (e.g. from regulatory authorities and management literature), and not as responses to the practical needs of the organization itself.

Moreover, procedures are often amended to prohibit actions that contributed to creating hazardous situations. Consequently, procedures have a tendency to become increasingly restrictive (Reason et al. 1995, in Mason 1997: 292). This is learning through a single feedback loop. Single-loop learning is a form of instrumental learning in which an organization seeks to improve already existing strategies and processes (Argyris & Schön 1996). The basic assumptions and underlying logic of the safety management system is not questioned. Single-loop learning is commonly contrasted to double-loop learning. This is a more advanced form of learning, which in addition to instrumental improvement, also calls into question the underlying logic of the system. In connection with the subject matter of this paper, double-loop learning would imply asking questions as to how procedures are to be used and whether formal procedures are the best way to manage safety.

Bourrier’s (1998, 2005) studies of compliance with procedures in French and American nuclear power plants in many ways highlights the importance of double-loop learning. She found that there were three crucial ingredients for a successful match between procedures and practice: first, there should be feedback from the lower to the upper tiers of the organization; second, the adjustment of procedures should be based on the views of those directly involved, particularly front-line workers; third, the time interval between worker feedback and implementing changes should be as short as possible.

This way of adapting procedures to practice, instead of trying to change practices to fit procedures, challenges the underlying assumptions of traditional safety management, in which there is a fundamental division between planning and performing work.

Bourrier’s studies show that it is possible to reduce the gap between procedures and practice. As will be seen, her findings are of great relevance to this study.

3. CASE DESCRIPTION

The primary task of onshore supply bases is to provide the logistics services necessary to the shipment of goods and equipment to offshore oil and gas installations. The oil company in question operates several supply bases along the coast of Norway. The supply bases are owned and staffed by supply service companies which offer their services to several oil companies operating on the Norwegian continental shelf. The supply service companies carry out all physical handling of goods between the goods' receipt and the wharf side (i.e. registration, handling and packing of goods).

Work processes on the supply bases include several hazardous operations. The loading and unloading of supply vessels involve cranes lifting heavy containers, drill pipes and other equipment. There have been serious incidents with crane lift operations on the supply bases, including a 17-ton chain cable falling from the crane onto the wharf. Such incidents involve severe material damage and have the potential to kill or seriously injure personnel working on the wharf.

Also, the work carried out on the supply bases affects safety in other parts of the logistics chain. In particular, supply operations have experienced long-lasting problems with objects (e.g. forgotten tools, stones, flakes of rust) falling from containers when the containers are lifted on or off the supply vessels. This is especially a problem when containers are lifted from supply vessels onto the oil installations, where the crane is up to 50 metres above the deck of the supply vessel. Any objects falling from this height have the potential to kill the seamen working on the vessel deck. There have also been incidents in which owing to faulty packing heavy equipment have fallen out of containers when they are opened, again with severe risks for the personnel opening the containers. In addition to these work-related incidents, the oil company in question suffered a serious incident when one of their installations was minutes away from a gas blowout that could have led to an accident similar to that on Piper Alpha.

All these incidents revealed deviations from procedures, some very serious. This created a great deal of attention on the company's use of procedures. The regulatory authorities were, of course, also quite concerned, and demanded that the company initiated some sort of measure to improve compliance with procedures in the company. This marked focus on procedures provided the backdrop for the changes that were made in the supply bases' safety management systems.

3.1 Objectives of the change project

The objectives of the change project studied were to improve the use of and compliance with procedures at the supply bases. This general goal was broken down into several more operational goals:

- There should only be one document regulating the supply base operations
- The document should cover relations of both customers and principals
- The document should contain the existing demands of all tasks involved in supply base operations
- The language should be easy to understand
- The operative workforce should be involved in the development of procedures

While the procedures were previously dispersed among 15 different documents, they were now collected into a single document. In addition to gathering the existing procedures into one document, overlapping procedures were merged so that the quantity of procedures was reduced. Also, the project sought to improve the quality of procedures by keeping the language simple and precise. The product of the changes was a document consisting of about 25 pages. The procedures described in this document, in the following text referred to as WR1, are meant to cover all work processes on all the company's supply bases. Our mandate was to evaluate the potential effects of these changes.

The logic behind the changes was quite simple. If there is to be any chance of procedural compliance, the users must know where to find the procedures, the procedures must contain relevant information and the users must understand this information. The criterion of worker involvement was seen as a prerequisite to achieving many of these goals. Despite this ideal scenario, the operative workers were not greatly involved in the initial formulation of the procedures. However, once a draft of the document had been formulated, all employees were invited to comment on and suggest improvements to the document.

As shown in the remainder of the article, these goals were achieved to a considerable extent. Nevertheless, there were still some areas where the changes did not have positive effects. There were even instances in which the changes may have influenced safety adversely.

4. METHODS AND DESIGN

The research described in this article is best described as evaluation research. The scientific merit of evaluation research has traditionally been controversial since it is, in many ways, 'commissioned work'. The problem to be addressed is defined by someone other than the researchers, and the organization funding the research may have political or economic interests connected to the results of the study. Thus, the scope, direction and results of an evaluation study may be influenced by forces other than 'pure' research interests. While this is certainly something to be aware of as researchers, we suspect that the same problem exists (to various degrees) in most organization research. The organizations involved in the research will always be stakeholders who may or may not have ulterior motives connected to the research. In this particular case, the company's motives for involving us as researchers in the evaluation were that they needed someone independent of the organization. The respondents and interviewees were people working for a subcontracting company, and it was considered important to reduce the risk that the evaluation was perceived as some sort of safety audit on behalf of the oil company. Hence, it was our expressed mandate to act as independent researchers in the project.

Furthermore, evaluations of safety interventions are important in order to determine which strategies can be expected to improve safety (Shannon et al. 1999; Robson et al. 2001). If we do not know 'what works', how are we to go about improving safety? Therefore, we see evaluation research as important for maintaining some degree of cumulative character in safety research.

It is also worth mentioning that transcending the traditional distance between researcher and research object not only represents a challenge, but may also have some advantages. For instance, evaluation studies often provide good access to the organization involved. First-hand knowledge of the organization is, in turn, crucial to finding the right informants, asking the right questions and making sound inferences.

4.1 Design of the study

Many would perhaps argue that, in terms of internal validity, studies involving evaluation of effects should be designed as experimental studies, or at least through some sort of before-and-after design. This has not been done in this study. Admittedly, this puts some restrictions on the inferences that can be made from the study, as we were not able to control the variation of factors other than the changes in procedures. However, there is quite a considerable amount of existing knowledge on the use of procedures in the Norwegian petroleum industry. For instance, biannual questionnaire studies of the trends in risk level on the Norwegian continental shelf reveal several problems related to the usability procedures (cf. Petroleum Safety Authority 2005). The same deficiencies, as well as serious violations, were also found in the investigation into the gas blowout on the Snorre A platform (Schieffloe and Vikland 2005). This illustrates that problems related to the usability of and compliance with procedures have been persistent in the Norwegian petroleum industry. There is little reason to assume that the supply bases differ from the rest of the industry in this respect, since they are subject to the same procedural regime.

Also, we have compensated for the weaknesses in design by complementing the quantitative analysis with extensive qualitative data. In our view, a qualitative approach is necessary in order to shed light upon the mechanisms generating compliance or violation. These are complex social phenomena which are difficult, if not impossible, to analyse through traditional, 'hard' scientific methods alone.

Ideally, the perceived effects of the changes should be accompanied by a reduction in the accident statistics. However, this was not the case in this study. If anything, there seems to have been an increase in the number of incidents in the year after the changes (Antonsen 2006). The purpose of this paper, however, is not to determine the relationship between procedures and safety statistics. Our goal is to shed light upon the mechanisms that facilitate compliance with procedures. Whether compliance with procedures is actually the safest way to perform work is not the main issue here. Therefore, we have placed the emphasis on how employees perceive and relate to procedures, and not how procedures eventually influence safety statistics.

4.2 Data material

As already indicated, the data material includes both quantitative (questionnaire) and qualitative data (interviews). The quantitative data material consists of 98 employees at the supply bases. The survey was in the form of a self-completing questionnaire, consisting of around 35 questions. The questionnaire was sent to all employees whose work responsibilities were regulated by the procedures. The survey's response rate was 80 percent.

The qualitative data material consists of individual and group interviews with a total of 28 informants. The interviews were semi-structured, and each interview lasted approximately one hour. The interviews were taped and later partially or fully transcribed.

5. RESULTS

In the following, we describe the results of our study. After a brief presentation of the overall perceived effects of the changes in WR1, we give the respondents' views on key characteristics of the procedures as well as the success factors behind the process of implementing WR1.

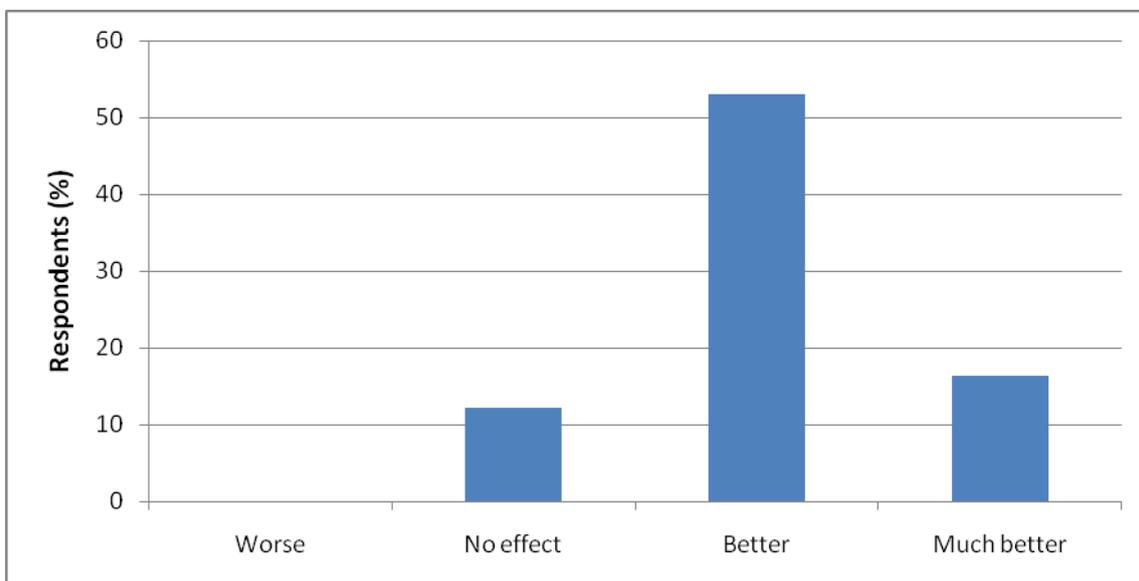


Figure 1. "All in all, how have the changes in WR1 affected safety?" N=80

Figure 1 shows the respondents' evaluation of the overall effects of the changes in WR1. Around 70 percent of the respondents perceived that the changes had improved safety. Although 12 percent of the respondents said the changes introduced through the new WR had no effect on safety, the overall response from the employees is highly positive.

The interview data reveal that the main factor behind this effect was perceived to be in the simplification of the body of procedures into one document:

If you can make things simpler, it will be an improvement. And my view is that they have simplified the procedures into one uniform 'bible', so to speak.

Having one document which was widely known and recognized among employees in different divisions, occupational groups and organizational levels provided a single point of reference for all activities on the supply bases. However, there is very little meaning in merely gathering the various bits of documentation in one place if nobody understands or adheres to the procedures. Some additional steps must be taken in order to reduce the gap between procedures and practice. These steps regard the characteristics of the procedures as well as the characteristics of the process of implementing the procedures.

5.1 Characteristics of procedures: Comprehensibility, accessibility and accuracy

If procedures are to have any chance of being relevant to real work situations, there are some prerequisites which should be satisfied. First, the employees must understand the language used (comprehensibility). If one does not understand the language used, one cannot understand the content of the procedure. Second, the information must be accessible to the employees (accessibility). There is no point in having good procedures if no one knows where to find them. This was a real problem prior to the simplification in the organizations we studied. Third, the procedures must contain a good description of the relevant tasks (accuracy). A procedure for which the information is faulty or inaccurate cannot (and rightly so) be expected to be adhered to in real work situations. As shown in Figure 2, the respondents largely view WR1 as satisfactory with regards to these three characteristics.

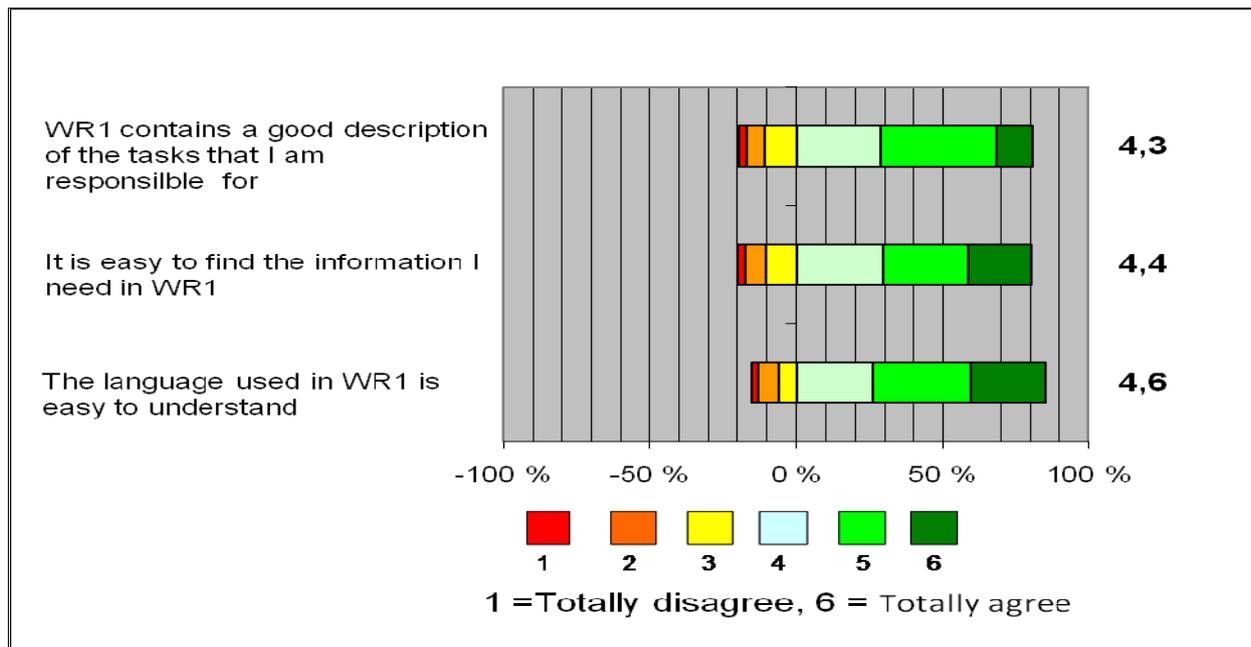


Fig. 2. Respondents' evaluation of the content of WR1. Percentages and mean values. N=87

Comprehensibility, accessibility and accuracy are not sufficient conditions for compliance to procedures but they are, nevertheless, necessary conditions as they reduce the probability of unintentional violations. As pointed out by Laurence (2005), voluminous safety management plans and procedures characterized by complex and complicated language cannot be expected to 'connect' with operative workers. Therefore, the development of procedures should be done with the operative workforce (not experts and regulatory authorities) as the main target group.

5.2 Perceived effects of the changes

5.2.1 Relevant information more available

Reducing the complexity was perceived to make the procedures more available to the workers. Over 60 percent of the respondents acknowledged that they either agreed or totally agreed that the changes in WR1 had made relevant information more available (Figure 3).

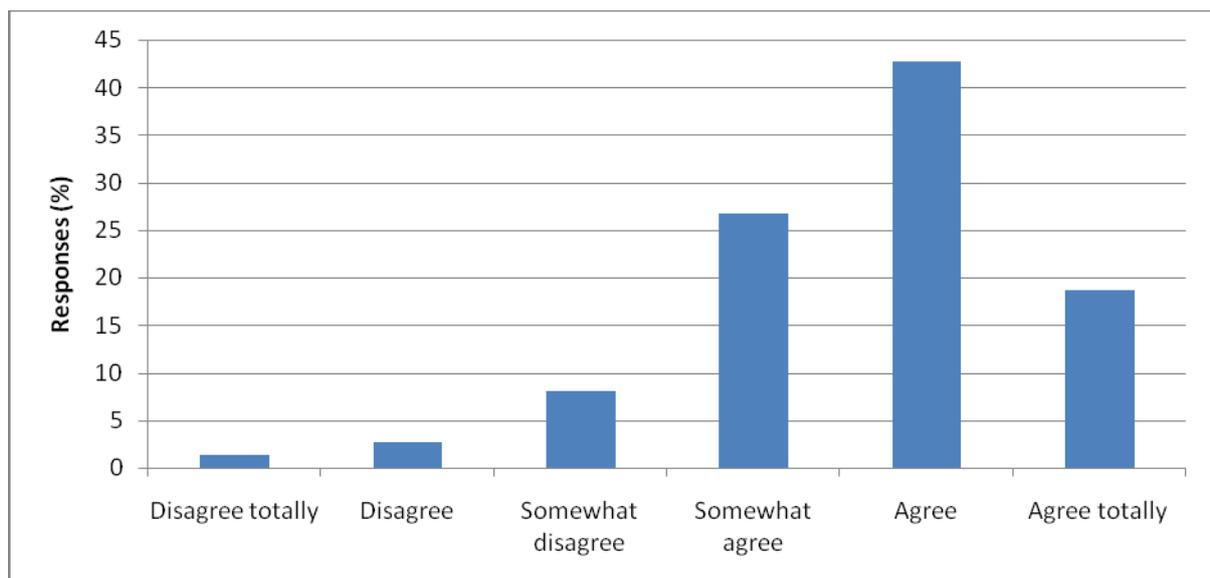


Fig. 3. "The changes in WR1 has made relevant information more available". N=75

Gathering the procedures into a single document reduces the workers' 'costs' of finding the relevant procedures (e.g navigating, sorting out irrelevant procedures):

There is quite a bit of knowledge in WR1, related to the work we do. (...) It is nice to have the document to look up and read a little bit about it. As opposed to before, when it was terribly difficult to find one's way [in the procedures]

Having one document as a 'bible' for all operations also has the unintended effect of making it easier to print paper copies of the document from computer-based systems. Strictly speaking, making paper copies is a procedural violation, as all updates of procedures are published through the computer-based system. However, making paper copies is, in many ways, a necessary adjustment in order to have the procedures available, especially for those workers who do not have immediate access to computers. Having a single document containing all relevant procedures can thus be a way of making it easier for operative workers and those with limited computer skills to gain access to procedures.

5.2.2 Clarification of the demands to work performance

In addition to, and probably also a consequence of, the improved access and availability of relevant procedures, the employees saw the simplification of procedures as a clarification of the demands pertaining to work performance (Figure 4).

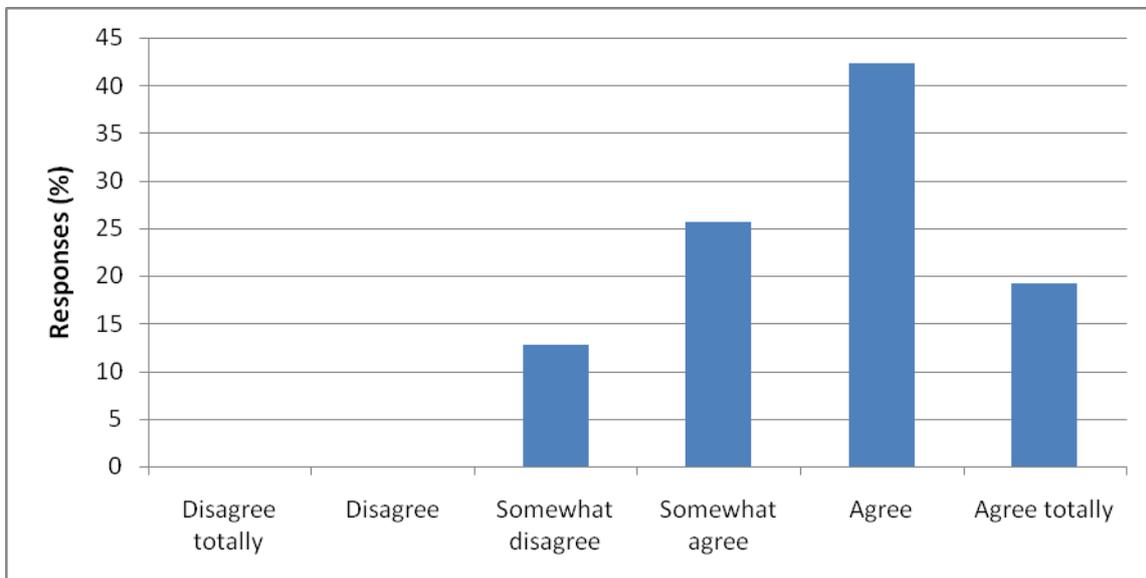


Fig. 4. "The changes in WR1 have made it easier to know the demands that pertain to work performance". N=78

This was perceived as one of the main positive effects of the changes, as only 13 percent disagreed in the statement.

The perceived clarification of demands is probably related to an increased knowledge about existing procedures. Although no objective assessments of the knowledge about procedures has been made, it seems highly likely that better access and availability will contribute to increased knowledge. The interviews also gave an impression of a high level of knowledge about the procedures in WR1. In addition to better access and availability, it is also very probable that increased knowledge about the procedures was a result of great attention towards the new procedures at the given time of our investigation.

Having one single document also gives a description of the work processes, which functions as a common point of reference between different divisions, groups and organizational levels. This serves to clarify the lines of responsibility between the different work processes.

5.2.3 Better compliance

The ultimate goal of simplifying procedures is to improve workers' compliance with the procedures. Figure 5 shows that the majority of workers report that compliance with procedures has improved after the changes in WR1.

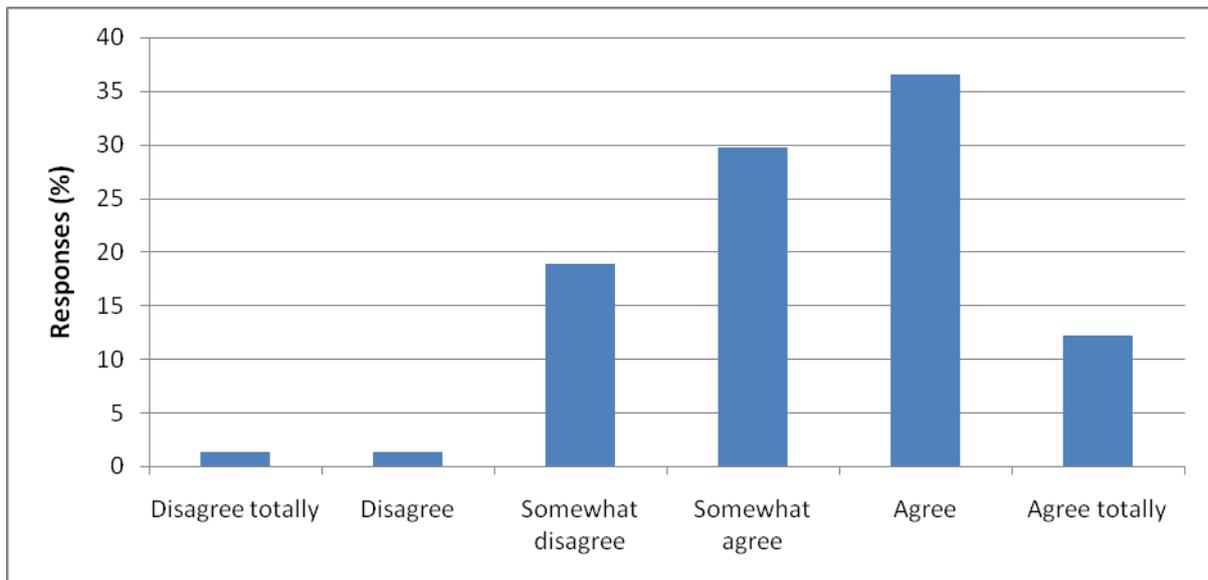


Fig. 5. “Compliance to procedures has increased after the changes in WR1”. N=74

This indicates that reducing complexity can be an important strategy in order to close the gap between formal and informal work practice.

This does not mean that procedures are no longer violated. In fact, 44 percent think that the procedures in WR1 are sometimes violated. Although most of these violations are attributed to customers or suppliers, which are also subject to regulations in WR1 (for instance through requirements for the packaging and securing of goods), violations also occur within the limits of the supply bases. When asked which procedures are violated most informants point to procedures that are seen as posing overly detailed restrictions on the workers. Complying with these procedures requires a great deal of time and effort, without the workers sharing the risk judgement underlying the procedure.

5.2.4 Easier to handle pressure from customers and suppliers

To the workers on the supply bases, the new document implied more protection against pressure from the oil and gas installations, which undoubtedly are the more powerful parties in the logistics chain. As Figure 6 shows, the majority of respondents reported that the new procedures had made it easier to handle pressure from customers and suppliers.

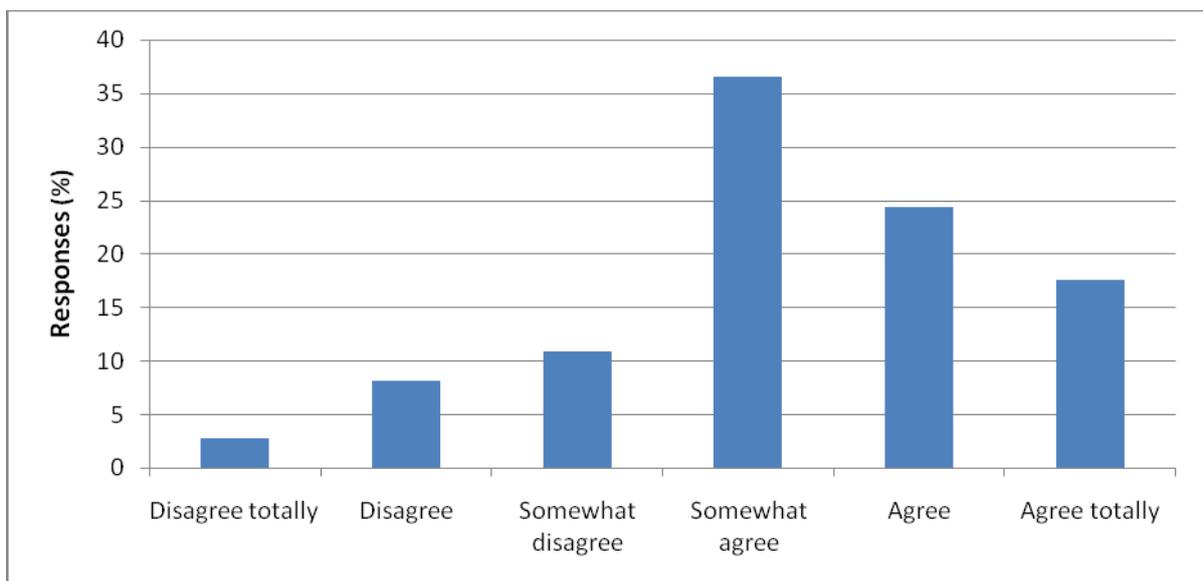


Fig. 6. The changes in WR1 have made it easier to handle pressure from customers and suppliers. N=74

In the interviews, this aspect of the new procedures was seen as involving a sort of empowerment compared with the previous situation in which there were less clear rules governing activities. This serves to illustrate that rules and regulations are not always perceived as control mechanisms. In fact, having a common standard for work performance seem to have reduced some of the strain and friction between different parts of the logistics chain:

It's a great tool. Almost everything is described in there. It is nice to be able to say, 'these are the rules here, and here is a copy of them', instead of having to explain and argument and getting angry customers. (...) 'We use it against the oil installations. Against them that try to take short-cuts, and try to make us take short cuts'

These effects seem especially important for the larger supply bases. The more complex the activity, the more the workers rely on formal procedures to handle pressure from suppliers and customers.

5.3 Some dissenting views

The positive picture painted of the effects above calls for some qualifications. There were certainly some dissenting views, which is evident in the number of respondents that chose to disagree to the statements that are presented graphically in Sections 5.1 and 5.2. The interview data provide some information about the sources of this dissatisfaction. Three such sources that stood out as particularly important were identified. First, some of the employees performing specialized tasks were dissatisfied with the new procedures because information about 'their' tasks had been removed. This had the practical effect that there was less guidance available for these tasks and, perhaps also a symbolical effect, in that it implicitly reduced these tasks to a sort of peripheral activity. Second, some of the interviewees were fundamentally opposed to procedures as such. These were probably also the interviewees with the least knowledge about the new procedures. Third, one of the supply bases had a long history of conflict between employees of the oil company and personnel from the supply service company. The climate for cooperation between these two groups was not ideal, something which seems to have influenced the implementation of the new procedures negatively.

5.4 Implementing the procedures: some success factors

Although important, reducing the number and complexity of procedures is only the first step, and in many ways the 'easy' part of the process of improvement. Achieving procedures in the operative parts of the organization can be challenging, especially in organizations where informal work procedures have been established.

The implementation of the new procedures was carried out in the following way. A draft of the document was presented to all employees comprising the enterprise contract as well as the local representatives of the oil company. The draft was discussed, and the employees had the opportunity to comment on ways to improve the document. The document was then modified and officially introduced as part of the current regulations of the organization. Importantly, the implementation process did not end at this point. There was continuous focus on the new procedures in weekly HSE meetings and other arenas regarding health, safety and environment. In addition, all employees were required to sign a statement that they had read WR1. Although some saw this as an attempt to transfer the juridical responsibility of accidents to the workers, the majority felt that the signature request highlighted the employees' responsibility to work in accordance with procedures. A third strategy in the implementation of the new procedures was the development of matrixes, showing which procedures were the most important for each function on the supply base. This is an effective way of helping the employees to categorize between the procedures which they are expected to have thorough knowledge of, and the ones which it is sufficient to be acquainted with.

Taken together, these strategies were successful in diffusing knowledge about the new procedures. One informant summed up the process in the following way:

There has been a lot of activity related to the implementation of the new procedures. A lot of people have been involved. For once, they [the oil company] have been very thorough. At least as I have seen it on my base, everyone that should know of the document has been invited to review the document. The implementation has been very good compared to what we have been used to before.

[Interviewer:] Previously they would have just handed over the finished document? – No, previously we would discover by coincidence that there had been introduced some new document regulating our work!

The employees responded very positively to the implementation process. The opportunity to discuss the form and content of procedures before they were formally implemented, as opposed to being presented with decisions already made, was especially perceived as an important success factor.

6. DISCUSSION

What are the lessons to be learned from the processes studied? As already indicated, we see the simplicity of the document and the worker involvement in the implementation process as the two main success factors. We now turn to the question of *why* these factors are crucial for reducing the gap between work as imagined and work as actually done.

6.1 Simplicity and involvement

That simple and accessible procedures have better chances of being used than procedures that are complex and inaccessible is rather self-evident: In the case of the supply bases, having a single document that describes the relevant work processes (and no irrelevant eventualities) reduces the ‘costs’ in time and effort involved in using the procedures. It is worth noting, however, that the process of simplification might have negative outcomes in making procedures too general to offer any real guidance on work performance.

Reducing the complexity of procedures is the easiest part of the endeavour to improve the match between work as designed and work as performed. The real challenge lies in the implementation of the procedures. Most safety researchers and practitioners have heard operative workers complain about procedures that are useless because they are developed by ‘pen pushers’ with little or no knowledge about practical work. In some instances, the introduction of formal procedures is seen as an attempt to overrule the workers’ practical knowledge (Knudsen 2005). Such reactions from operative workers illustrate that procedures are often perceived as something which is imposed from higher organizational levels. We suspect that this perception is, to a large extent, a correct view on the way procedures are being implemented in organizations. This is one aspect of what previously was labelled a loosely coupled system (Meyer & Rowan 1977), characterized by a fundamental distance between the *makers* of procedures and the *users* of the procedures. We argue that this distance is the main factor causing the gap between work as designed and work as performed.

In our view, the success of the change process studied here is largely due to the attempts to tighten the coupling between procedures and practice. This was done through the involvement of employees on different levels, something which gave the process a strong local anchoring. The role of worker involvement in the implementation process can be seen in relation to Bourrier’s (1998, 2005) findings, which were described in Section 2.2. All the factors critical for compliance highlighted by Bourrier (feedback, worker involvement and closeness in time between feedback and change) were present in the process studied. This was not a deliberate strategy on behalf of the managers of the oil company. In fact, in the initial phases of the study, the level of involvement was rated as so low that the oil company representatives felt there was no need to include issues of worker involvement in the investigation. We were therefore rather surprised when the workers expressed such positive views on the level of involvement. Although no operative workers participated in the project group that produced the *draft* of the document, the workers perceived that they had influence on the *final* document by being invited to comment and discuss the draft. Although worker participation has long-lasting traditions in Norwegian working life, this is a broader form of involvement than that common in the Norwegian oil industry. The common form of worker involvement in the industry is to have safety delegates and union members as representatives on committees and in project groups, whose tasks are likely to affect the workforce. However, this only involves a few selected members of the total workforce and might not be perceived as broad involvement of the end users.

As opposed to this representative involvement, the implementation of WR1 was characterized by a more direct form of involvement, as it sought to involve *all* end users of the document.

The dialogical character of the process is emphasized by one of the informants:

Compared to other oil companies, I think this one has a more humble attitude towards their subcontractors. (...) They don’t just say: ‘This is how it’s going to be – fix it by tomorrow!’ We can always discuss things, there is plenty of headroom. So even if the customer is always right, this customer is willing to listen to other points of view

Previous studies have shown that such two-way communication is important for organizations’ learning ability and thus for safety (Antonsen et al. 2007). Also, commitment-based approaches to safety work (e.g. worker involvement) have been shown to correlate with employees’ commitment to safety and trust in management (Barling & Hutchinson 2000). From an operative worker’s perspective, a procedure can be viewed

more as a possible resource among other resources for solving the given task, than a recipe for their behaviour to be acted out. Given the tendency of the tasks of others to be stereotyped and simplified when viewed from a distance, the perspective of the practitioners is probably one of the best judges on the level of detail needed (Suchman 1995).

6.1.1 The risk of oversimplification

As already indicated, some of the interviewees felt that the simplification of the documents had led to the removal of important information, and had thus brought about unanticipated and unwanted consequences. This raises an important question regarding the level of detail in work procedures. Should procedures be detailed prescriptions of task performance, or is it sufficient to have broader functional requirements? Our analysis shows that it is impossible to give one general answer to this question. Whether simplification can be considered an improvement depends on the nature of the tasks involved. For some tasks, e.g. tasks that are performed rarely, are highly complex and/or require a high degree of coordination, it is probably necessary to have quite detailed descriptions and regulations. Other, more routine tasks do not demand the same level of control and can thus be governed by more general functional requirements. These two strategies for the controlling and coordination of work activities are the extremities of a continuum that ranges from detail control and standardization on the one hand, and autonomy and professional judgement, on the other. Determining the level of detail control along this axis should be based on consideration of the nature of the tasks involved. This further underlines the importance of worker involvement, as the operative workers are, in many ways, the experts of the practical tasks and the context in which the tasks are performed.

6.1.2 Attitudes and procedures

Our focus on the properties of procedures and the way these are implemented does not mean that individual attitudes towards procedures can be disregarded. While collecting the data for our study, we certainly encountered individuals who were opposed to procedures in general. These employees expressed frustration about procedures not allowing them to use common sense and perform work in a way that *they* saw as the best way. The resistance towards procedures is not synonymous with a disregard for safety. What these employees protested against was the formalization of safety. They saw safety as resulting from sound professional judgement and practical work experience, not as something that can be expressed through written procedures. This means that the continuum between detail control/standardization and autonomy/professional judgement, as described in Section 6.2, can also serve to describe individual attitudes towards procedures. Since individual attitudes (and perhaps also group cultures) are likely to vary along this axis, it will be impossible to reach a situation in which there is a complete consensus on the role and quality of work procedures.

6.1.3 Conflict and change

The third of the dissenting views presented in Section 5.3 related to the level of conflict in the organizations studied. The level of conflict seems to have significantly influenced the change process. The supply base with the highest level of conflict did not achieve as positive results as the other bases. The conflict had originated in connection with some organizational changes more than a decade ago, when some employee groups were transferred from the oil company to the supply service company. This involved losing some fringe benefits and was seen as degradation in terms of status. This caused great controversy among some of the employees. Some of these conflict lines still persist and seem to pose difficulties in building trust and cooperation between some of the groups involved in the supply base activity. Of course, a poor climate for cooperation between the management and operative levels does not facilitate management-induced change processes.

This illustrates that organizational change processes rarely follow a predictable, strictly rational pattern. Historical aspects such as old conflicts can constitute considerable 'noise' in the implementation process, which in turn may influence the way change processes are translated into real work practices.

6.2 Why is worker involvement important in implementing procedures?

By this point in the article, it should be clear that we regard worker involvement as the key condition for achieving a better match between procedures and practice. The question that remains is *why* worker involvement is so important.

We argue that worker involvement has at least three side effects that are crucial in building acceptance and adherence to safety procedures:

1) Being consulted in the development of procedures is likely to increase workers' ownership of the procedures. This sense of ownership, in turn, is important for the legitimacy of procedures, since it reduces the chance that procedures are perceived as instruments of external control, developed by people without practical work experience. A higher degree of dialogue in procedure development may thus contribute to bridge some of the cultural differentiation that often exists between safety managers and shop-floor workers, as described in Section 2.1.

2) Worker involvement in procedure development provides safety managers with an opportunity to communicate the intentions underlying procedures. This, in turn, forces safety managers to actually consider their own intentions, i.e. how the procedures should be interpreted, how workers should use procedures and how the formal procedures relate to real work performance. This represents a form of learning on behalf of safety managers since it challenges the traditional division between the planning and performing of work: By engaging in a dialogue about the contents and use of procedures, safety managers will be more directly confronted with the relationship between procedures and practice and in that way forced to consider the workers' point of view on procedures.

3) Establishing a dialogue between the makers and the users of procedures can also be instrumental in diffusing knowledge about the contents, role and logic of procedures. As knowledge on procedures is a fundamental criterion for compliance, this factor should not be underestimated.

4) Procedures are tools or resources used by the workers beyond their mere prescriptive function. Their usage as parts of the workers' inventory of tools and resources transcends mere compliance and violation. For example, it seems that WR1's status as a single paramount reference point made it a better tool for handling relations with customers and suppliers. Also, it was easy to print a copy of it (although this was frowned upon by the management) and hence more 'handy' to carry around, and this is not at all irrelevant to compliance. Tools must be created with a view to the context in which they are meant to be used and on the hands in which they are supposed to fit. Section 2.2 described how the procedure functions as a tool for management, e.g. fixing responsibility and demonstrating commitment to safety work, and that this may lead to undesired side effects such as an uncontrolled growth of procedures, thus probably making it less usable for the operators. Worker involvement in the procedure construction is a good way to gain input about their functions in practical use, and to create tools that actually fit the challenges posed by the situations in which they are used.

These four side effects of worker involvement may seem trivial and self-evident. After all, the importance of worker involvement has been stressed in theories of action research and organization development for decades. However, in the field of safety management, these insights seem to have been largely neglected. Bureaucratic control systems keep on being developed without questions being asked as to whether these systems actually work as intended. Therefore, there seems to be a need to communicate the ideals of worker involvement within the field of safety management.

6.3 Are the improvements permanent?

Despite the problems described in Sections 6.3, 6.4 and 6.5, the results of our study show that the simplification of the work requirements and the involvement-based implementation process has led to a distinct improvement in the workers use of and adherence to work requirements. However, is this a lasting effect or will things go 'back to normal'?

This is, to a large extent, a question about whether the company is able to maintain the simplicity of the document and the sense of ownership created during the implementation of WR1. There are some aspects of safety management systems that pose challenges for both simplicity and involvement. As already indicated, learning from incidents, a major goal of all safety management systems, often involves regulating ever more aspects of work through procedures.

Also, there are some intricate features of procedures and work process descriptions that sometimes inhibit discussions about them. For us, it was best illustrated by discussions taking place at an early stage of the project: To get input from the workers and to ensure involvement in the evaluation of the changes, representatives from both workers and safety managers were invited to a workshop. A recurring phenomenon in this workshop was that the worker representatives claimed that not all problems could be solved by procedures. However, when the workers were prompted to give examples, the procedure team was always able to 'solve' the problem by referring to the existing system. The example could either be included in working practice by the feedback mechanisms in the governing documentation or it was classified as breaches. The key point, that there was always something that did not fit, was obscured because every example of this could be made to fit. The relationship that the documentation has to its surroundings is such that every piece of the *praxis* in the workplace can be fitted into it, although, always piecemeal. Hence, the argument that the complexity of the work in the real world is too great to

fit into a document is difficult to exemplify. Why can the document not cover the whole work when it evidently *can* cover every piece of it?

Without addressing these tendencies towards producing more and more procedures to cover every aspect of work, the achieved simplification and usability will be only temporary. One of our informants, a safety manager, also underlined this point:

When you have such revisions of the body of procedures, you often end up with removing the procedures seeking to standardize solutions to eventualities for which there really was no need for procedures in the first place.

This underlines that the match between work as designed and work as actually performed should be monitored continuously, rather than through periodical revisions only.

6.4 Addressing the gap between procedures and practice: opportunities for building resilience

Why is it important to address the gap between procedures and practice? We propose that investigations about the match between procedures and practice represent a form of ‘organizational inquiry’ (Argyris & Schön 1996) which, in turn, can form the basis of organizational learning. By looking beyond the relationship between individuals and procedures, and focusing more on system properties and the context of work, inquiries into the relationship between procedures and practice can be opportunities for double-loop learning. Here, the subject matter of reflection is not only how to design a good work process, but also *how* work process designs are best used in governing the work processes.

The ability to reassess current processes, strategies and models of risk is a central part of what has recently been labelled organizational *resilience* (Hollnagel et al. 2006). Addressing the gap between procedures and practice can thus be seen as an opportunity to create resilience. It is the only way of making ‘silent deviations’ visible (Tinmannsvik 2008). Some of these deviations from procedures can be smarter and safer ways of performing work, while other deviations may involve short cuts that compromise safety. In any case, the process of explicating such silent deviations is an essential step in asking a larger question: how well are the organization’s existing safety management strategies matched to the demands of the organization’s work activities and organizational environment?

This raises another question: is it possible to *eliminate* the gap between procedures and practice? In our view, this would be impossible since the number of local, situational variations that constitute the context of work is indefinite. This variation is thus impossible to describe in formal procedures. Some sort of translation and adjustment between plans and situated action therefore seems unavoidable (Suchman 1987). Furthermore, an elimination of the gap between procedures and practice is quite undesirable, for exactly the same reason: for organizations to perform safely, the ability to adapt to local variations is necessary. This is especially visible in crisis situations, where the ability to respond vigorously is of critical importance. When a crisis emerges, there is rarely time to consult procedures and formal documents. The ability to make exceptional violations may thus be safety critical. In addition, crisis situations may come as fundamental surprises, to which there simply are no procedures or emergency plans. The ability to cope with such situations hinges on the ability to improvise and act creatively (Sætre 2006). Paradoxically, the very autonomy and improvisation that organizations try to reduce in order to create barriers towards *occupational* accidents may be their greatest asset in order to tackle the larger, *organizational* accidents. The fact that there could be an antagonistic relationship between safety in day-to-day operations and safety against ‘worst case scenarios’ has important implications for the management of safety: one should be very careful not to rely too heavily on detail control and strict procedures as this could, in fact, affect safety adversely. Hence, we agree with Rasmussen (1997) that organizations should not strive to control behaviour by fighting deviance from pre-planned paths, but rather by making the boundaries for acceptable behaviour explicit and known.

7. SUMMARY AND CONCLUSIONS

The article reports the findings of a study of a successful change process which aimed at improving procedures on Norwegian offshore supply bases. Our analysis highlights some fundamental conditions that should be satisfied if procedures are to have any influence on actual work practice. The changes in procedures made the procedures more concrete and more accessible to the workers. This, in turn, resulted in better compliance and more active use of procedures. The success factors behind these improvements are to be found both in the simplicity of the document and, more importantly, in the broad and direct form of worker participation that characterized the process of implementing the procedures. The main conclusion to be drawn from our analysis is

that addressing the gap between ‘work as imagined’ and ‘work as actually done’ can serve as an opportunity for ‘double-loop learning’, which in turn is a prerequisite for building organizational resilience.

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