



Learning from incidents: Practices at a Scandinavian refinery



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ABSTRACT

This paper reports on a study of practices used to learn from incidents with the aim of improving safety performance in a Scandinavian refinery. Data for the study was collected during five months of fieldwork at the refinery and interviews with 70 refinery employees. In this paper, we examine how managers, engineers and operators at the refinery participated in activities aimed at learning from incidents. Incident learning did not just happen through formal incident management processes, but also through daily work practices. Hence, workplace learning may be an interesting lens through which to examine employee practices to learn from incidents. We found that employees executed learning-related tasks in different ways from formal presentation of reports and risk reducing measures to informal meetings and discussion raising the reflexivity of employees. We conclude this paper with recommendations for learning practices in large-scale industrial environments.

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1. Introduction

Few would deny that learning is important in organizations that work with high-risk technologies in dynamic and volatile environments. Much research is devoted to understanding how this process can be expressed and measured, how the “right lessons”¹ can be learned and how companies can facilitate more efficient and effective learning (see e.g. Drupsteen et al., 2013; Hovden et al., 2011; Jacobsson et al., 2011). Organizational and safety research has identified a variety of factors that either inhibit or facilitate learning from incidents (see e.g. Pidgeon and O’Leary, 2000; Schilling and Kluge, 2009; Smith and Elliott, 2007; Størseth and Tinmannsvik, 2012).

But there is still much to learn about the actual practice of incident learning. We do not really know how learning “happens” in the day-to-day work in high-risk industries. What we need are empirical studies of the practices by which organizational members seek to learn from incidents and try to incorporate lessons in their working routines (Lindberg et al., 2010).

One industrial sector in which these processes may be studied is the oil and gas industry. Learning in this sector is both critically important and very hard. Recent disasters (think of the Deepwater Horizon disaster in 2010) underline the importance of learning

(Skogdalen, 2011). At the same time, the BP Texas City, Tesoro Anacortes, Longford and Buncefield accidents have shown that it may not be easy to learn the right lessons.² The petroleum processing and refining industry is a highly competitive globalized industry with large, and, in Europe, often aging production facilities (Wood et al., 2013). The industry has to balance the need to reduce costs with the necessity to improve safety performance.

In this paper, we present findings from an exploratory study of a Scandinavian refinery. We wanted to study a refinery where there was a systemic emphasis on learning from incidents. We chose our particular refinery in a country where the regulation regime and national supervisory body prioritize learning from incidents and accidents at petroleum-related facilities.

We selected this particular refinery because it was the largest refinery in the host country and because it had been the site of several serious incidents during the 2000s.³ In the context of the European refinery industry, it is a medium-sized refinery. The refinery consists of a natural gas liquids fractionation plant, a crude oil terminal and crude storage facilities, a combined heat and power plant and a refinery with a refining capacity of 12 million tons per year. The refinery used a safety barrier approach and risk-based tools as part of its safety management (Vinnem, 2007).

This organization was a real “learning lab” given the many incidents it had to handle. The company that owned and operated the

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¹ The strong normative connotation of learning described as the “right lessons” is a typical perspective of research on learning from incidents.

² Hopkins (2009) argues that the Texas City refinery accident could partly be explained by failures to learn from previous incidents.

³ None of the accidents led to fatalities.

refinery granted access to the site and all relevant documentation. The refinery organization had been criticized by the supervisory authority for not doing enough to learn from incidents following an audit in 2010. However, the selected refinery was working to improve learning from incidents, and was willing to allow the lead author of this paper access to its operations and employees.

The research questions were straightforward: What do practices aimed at learning from incidents consist of, how are they carried out and what are their results? In this article we describe how employees understood and experienced activities to learn from incidents as part of their working lives. Our research is based on analyses of extensive fieldwork and interviews with 70 employees at the refinery. We start by discussing theoretical perspectives on incident learning. We then present the findings of our fieldwork. After discussing our findings, we conclude with an overview of implications for practice and theory.

2. Theoretical perspectives on learning from incidents

Organizations that work with complex, high-risk technologies in volatile environments cannot afford to wait for a crisis or disaster to happen and then start learning. They must exploit every opportunity to learn. Every incident or near-miss represents such an opportunity.

Organizations that do this all the time and continue to perform successfully are described as being High Reliability Organizations (HROs). In recent years, we have seen the rise of these HROs in the safety literature (see e.g. Ansell and Boin, 2011; Bourrier, 2011; La Porte, 1996; Roe and Schulman, 2008; Sagan, 1995). The literature portrays HROs as a remarkable type of organization, marked by a strong organizational culture in which a desire to learn from incidents and near misses features prominently (LaPorte and Consolini, 1991). In HROs, learning apparently “happens”; it is the automatic resultant of a willingness to learn. Yet, we really do not know exactly how learning happens in these or other organizations.

In this paper, we view learning in terms of knowledge development (Braut and Njå, 2013; Paavola et al., 2004; Schultz, 2002). The context is incidents as undesired events that are scrutinized for causes and risk reducing measures. We understand learning as changes in knowledge; development of new knowledge and confirmation of existing knowledge, all in relation to existing work practices of individuals, groups or organisations. These changes can, but do not necessarily lead to changes in procedures, routines or equipment and therefore work practices.

Learning can and does happen all the time, but it is often suggested that crises create special opportunities for learning and implementing lessons (Stern, 1997). Crises can have a powerful effect on individuals: they focus attention and demonstrate the necessity of change. They create external pressures to learn lessons and implement reform. In recent years, we have seen how large-scale events such as the NASA shuttle explosions, 9/11 attacks, Hurricane Katrina and the terrorist attack in Norway have created powerful incentives to learn and reform.

Crises, which can be likened to severe incidents in many ways, can also generate negative stimuli to learning (Brauner et al., 2005) and create barriers to reform. Crisis-driven reform processes have also shown that learning can easily become politicized (Boin et al., 2008). But in most organizations, learning is not easy, certainly not “given” (Stern, 1997; Van Duin, 1992). Etheredge (1985) and Stern (1997) have identified a variety of cognitive and organizational factors that make collective learning difficult.

In this article, we focus on individual learning. Our approach assumes that effective learning happens through the experience and actions of individuals (Argyris and Schön, 1978). We see

learning as a production process that occurs through some form of active participation and interaction (Blackler, 1993; Lave and Wenger, 1991). Learning requires involvement (Corradi et al., 2010). It consists of iterative processes, studying causal processes, initiating corrective actions, monitoring the effects, and so on; Stern (1997) speaks of “experience-based learning.”

We are interested in these “practices for learning” (Gherardi, 2001; Nicolini et al., 2003; Strati, 2007). Studying practices means examining interactions in their organizational context (Lave and Wenger, 1991), the workplace, and entails looking at what people actually experience and do (Nicolini et al., 2003). Boholm et al. (2011, p. 4) note: “one must approach practices as they are understood and negotiated by those who do and who do not participate in them.” To study and describe learning practices, we must present the voices and understandings of the individuals who do the learning (Nicolini, 2012). This means examining learning as it occurs using methods inspired by ethnography (e.g. Engeström, 1993; Lave, 1993; Lave and Wenger, 1991). This approach emphasizes the importance of learning situations: moments where learning seems imminent required and expected.

Incidents provide just such a situation. We examined how our respondents understood learning in relation to incidents, and how they thought learning from incidents occurred at the refinery. These individual understandings of learning tell us something about the structures and systems put in place by the refinery organization, and the emphasis that leaders at the refinery placed on learning from incidents (Russell Vastveit and Njå, 2012).

3. Studying learning practices

Studies of the literature on incident learning describe a need for empirical studies (Le Coze, 2013; Lindberg et al., 2010; Drupsteen and Guldenmund, 2014). Our study is based on extensive fieldwork, making use of observations and interviews. It provides insight into the variety of processes that make up efforts to learn in a single organization. It shows – despite an organization’s attempt to control and direct learning efforts – how practices, and the way employees experience them, can vary.

In her fieldwork at the refinery, the lead author observed how incidents were handled and how people carried out their work. She started with an initial observation period at the refinery, shadowing leaders, engineers and operators in the operative, maintenance, safety, modifications, technical safety and integrity units. During this period, she observed daily and weekly department meetings, health, safety and environment (HSE) and risk analysis meetings; as well as other activities related to incidents and the safety information system at the refinery. She also spent four weeks observing operators who worked in the process area in the refinery and the oil terminal.

Observation studies build on the assumption that subjects retain usual patterns of behavior and interaction, even when observed. To reduce the potential impact of her presence, she stated clearly what our goals were, emphasized that the anonymity of respondents would be respected. The combination of interviews and observations was beneficial with regard to developing knowledge because the researcher was acquainted with the refinery. Where there was a discrepancy between observed practices and responses during interviews, this could be discussed with respondents.

We interviewed seventy employees. We selected our respondents based on level of experience, gender and work areas (for example different plants within the refinery). Contact persons in the departments at the refinery assisted by suggesting employees who fit these criteria. In addition, the lead author had knowledge of the organization and particular employees who fit the criteria

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