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Incident reporting or storytelling? Competing schemes in a safety-critical and hazardous work setting

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Abstract

Incident-reporting schemes can prevent accidents through organizational learning from incidents. However, many occupational health and safety incidents go unreported. For these reasons I undertook ethnographic fieldwork to investigate the low level of reporting among railway maintenance technicians in Sweden and the role played by informal storytelling within their occupational communities. The study found that the incident-reporting scheme is not integrated in technicians' practices and cultural frame and does not seem to serve their interests. Storytelling, however, is an integral part of technicians' practices and their accident etiology and creates a way for them to address risks, at least from a narrow perspective. The occupational etiology is based upon technicians' local practice, which emphasizes vigilance, carefulness, skill, responsibility, and the like, and usually neglects root causes. This frame is rational and intelligible, given the technicians' limited power to influence their working conditions, as well as their limited training and the poor feedback they receive when incidents are reported. However, the occupationally-based perspective impedes the articulation of a systems perspective that could be used for organizational learning. To make an incident-reporting scheme work, employees must be given ownership, must know how and why to use it, and need feedback on root causes. These root causes must also be addressed.

Keywords: Non-reporting; Storytelling; Accident etiology; Organizational learning; Breakdowns; Occupational communities

1. Introduction

Railway technicians are responsible for maintaining the physical infrastructure of the railway to support safe and timely transport. Their work necessarily exposes them to a variety of physical dangers such as trains running along the tracks and high-voltage power lines. Incident-reporting schemes are therefore extremely important in order to prevent accidents. They are also important in occupations where similar situations arise, such as police work, fire-fighting, and nursing. Unfortunately, in the case studied for this paper, the number of

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reported occupational health and safety incidents was very low, impeding the usefulness of the incident-reporting scheme. This article seeks to explain the reasons for the low number of reported incidents by comparing the characteristics and functioning of the incident-reporting scheme from the technicians' perspective with that of informal storytelling. In addition, the consequences of low reporting for organizational learning from incidents and for systematic occupational health and safety management are discussed.

In 2002, I attended a workplace meeting at *Banverket Produktion*, which is the major contractor for railway maintenance in Sweden. One of the supervisors told the attending technicians that the number of reported occupational health and safety incidents was lower than the number of accidents, which he thought was strange: "This cannot really be the case, there must be more incidents. Don't feel ashamed to report them". In response though, one of the technicians argued that "it is difficult to know what constitutes an incident if nothing happens" (Fieldwork notes, May 2002). The supervisor's comment suggested both that he was influenced by ideas of the iceberg metaphor but also that he mainly attributed technicians reluctance to report incidents because they felt they had caused the incidents through shameful practice. The technician's response though, suggested that technicians might have a different conceptualization of incidents.

In 2003, in response to corporate and regulatory demands for a systematic safety management system, *Banverket Produktion* introduced the safety management system Synergi, replacing previous incident-reporting schemes (Järnvägsinspektionen, 2002). *Banverket Produktion* anticipated success because of the system's technical sophistication and its success in the Norwegian off-shore activities for which it had been developed.[1] However, while the number of reports of transport-related incidents has increased, the number of reported occupational health and safety incidents has not.[2] This article argues that the official incident-reporting scheme in *Banverket Produktion* has been outperformed by technicians' storytelling in terms of the number of reported occupational health and safety incidents.

There are many reasons why storytelling is the preferred mode. Different accident etiologies shape what is considered an incident in different communities. They also shape the pattern of reporting and non-reporting, as well as what are considered appropriate measures after an incident. For one thing, the incident-reporting scheme is not integrated into technicians' practices and cultural frame and it does not seem to serve their interests. Storytelling, however, is an integral part of their practices and their specific accident etiology and it provides a way for the technicians to address risks, although, as I will point out later, from a narrow perspective. The technicians' accident etiology gives meaning to their work, to their understanding of accidents, and to the "repair" work required. The occupational etiology is based upon their local practice, emphasizing vigilance, carefulness, skill, responsibility and so forth, and usually neglects root causes. This frame is locally rational and intelligible, given the technicians' limited power to influence their working conditions, as well as their limited training and the poor feedback they receive when incidents are reported.

However, storytelling is of limited value from the perspective of organizational learning and occupational protection. Firstly, stories are not as widely shared as they warrant, which limits the opportunity to learn how to prevent similar events to the circles in which the stories are told. Secondly, stories are shaped by the shared values and norms within the social context in which they are told. Thus technicians emphasize attention, vigilance, personal responsibility, carefulness and the like as the major means to maintain safe practice, but pay too little attention to the wider context of accident causation. Consequently, storytelling is not a perfect substitute for incident-reporting systems. Possible ways of addressing these drawbacks of storytelling are discussed in relation to each of the three incidents presented here and in the conclusions.

Three major theoretical perspectives underlie the arguments in the article. First, railway technicians' work is characterized by balancing demands for train safety, punctuality, and production against their own safety (De la Garza and Weill-Fassina, 1995). This balancing is to a large extent accomplished through their own efforts and understanding of their work as part of a complex and highly interdependent socio-technical system. Second, accidents and incidents represent breakdowns of understandings of risk and the corresponding means

[1] Personal notes from Erland Nydén's presentation at the Banverket annual safety conference, Borlänge, Sweden, March 2003, and from www.synergi.com.

[2] Personal communication from the technical manager for Synergi for Banverket in November 2006. The manager attributes the increased reporting of transport-related incidents to pressure from top-level management in *Banverket Produktion*.

of addressing them. Incidents are breakdowns that do not involve damage or injury (Turner and Pidgeon, 1997; Suchman, 1961). Third, incident-reporting schemes are a kind of organizational communication, and they can be used in similar ways to storytelling to promote organizational learning and prevent accidents (Coan, 2004; Weick, 1995).

Before proceeding with my analysis, three major issues have to be addressed. First, occupational health and safety incidents in railway maintenance are less frequently reported than those related to train safety because they are regarded as less important. Analyzing why this is the case may provide a partial answer to the problem of the low rate of reporting. Second, the absence of injury makes it possible to hide an incident. But why is it considered important to be able to hide an incident? What is worth hiding? Instead of comparing the reasons for reporting traffic related incidents or occupational health and safety incidents, I will focus on analyzing occupationally-based rationales for reporting or not reporting occupational health and safety incidents to an incident-reporting scheme, without regard to the reporting of train safety incidents, but instead with regard to corporate practice regarding incident reporting. Third, all the empirical data drawn on for this article dates from 2000 to 2003, the years before or just at the beginning of the period when Synergi was introduced. However, because no means have yet been put in place to address the obstacles to its use that are identified in this article, the conclusions drawn here are probably still valid when it comes to explaining the continued low frequency of reported occupational health and safety incidents after 2003.

As in the case of corporate responses to accidents, employee understandings and repair of accidents must be accounted for not only in terms of the accidents themselves but also in terms of the cultural frames and material practices that preceded the accident, and were disrupted by it. In order to be able to analyze occupationally-based rationales on their own terms, rather than as irrational anomalies, there is a need for ethnographic data on the concerned occupational communities and their work. Ethnographic data will throw light on sense making in these communities.

Section 2 of this article is followed by an outline of the underlying conceptual assumptions behind incident-reporting schemes in terms of accident etiology and organizational learning mechanisms. These assumptions are then contrasted with occupationally-based storytelling and accident etiology. Thereafter, the occupationally-based scheme for reporting and analyzing incidents is analyzed as well as the corresponding repair mechanisms using three incident stories collected during my fieldwork. Finally, I present the implications for understanding incident reporting and outline the actions required to learn from incidents in order to prevent accidents.

2. Methods and data

I collected the data for this paper mostly in Midtown, Southern Sweden,[3] in 2000 and in 2002–2004. In total, I spent five months in the field, followed by interviews and focus groups. Because I was interested in how different activities were coordinated in order to have the trains run safely and on time, I deliberately divided my attention between different occupations: high-voltage technicians, signal technicians, track technicians, dispatchers and train drivers. I also attended a two-week safety-training course that certified me for risk assessment of track work as a *watchman* or *lookout man* (watching out for approaching trains and warning those working on or near the tracks) and as "person in charge of possession" (that is, entitled to organize exclusive track occupancy). The observations were followed by a small number of interviews.

Getting access to the field was generally easy, probably because the Swedish railway system is still largely state-owned and oriented to serving the entire nation (Kjellvard, 1949; Forsell, 1998). However, it took some time and effort to achieve rapport and establish the necessary trust between the informants and myself. I came to an environment in which there was no previous experience of research and no existing role for me to fit into. I intentionally took a rather passive stance: I explained who paid me, what the purpose of my stay was and what good it might bring. The technicians gave me nicknames, mostly jokingly but always with serious undertones, that reflected their expectations of my role and what could be expected from me: the Professor, the

[3] All personal and geographical names have been changed. However, all those cited in this paper have been given an opportunity to review the final draft in order to ensure factual accuracy and their integrity.

Time-and-Motion-Study Man, the Candidate, and the Trainee. I was put to test: expected to answer "scientific" questions, exposed to jokes, and provoked through pretended racism, sexism or questioning of the point of doing research at all. In addition to verbal tests I was also assigned work: carrying heavy stuff, fastening screws, attaching track circuit clips and ground wires, and so forth.

The verbal testing and the work I was assigned can be seen as part of an apprenticeship process in a hazardous environment that requires mutual trust in the team. It resembled the kind of testing among the high-steel ironworkers that Haas (1977) observed. The kinds of task I was assigned were simple ones that did not require a complex understanding of the whole production process, as is the case in the beginning of apprenticeships (Lave and Wenger, 1991). Nevertheless, these tasks represented a minor investment in trust. If successfully carried out, they constituted a sign of trustworthiness and a clearance to move into more important tasks, as well as increasing faith in my moral qualities and loyalties. Very early on in the project, I was appointed as watchman, which is indeed a sort of test that involves some risk-taking on their part. To me, this risk-taking was itself a sign of trust. My training as an apprentice also involved telling me stories. Sometimes these stories were merely alluded to, as in the following event:

> Helge and Håkan, high-voltage technicians, are inspecting a control box for local switch heating equipment. The box is located near the tracks, with its doors opening towards the forest surrounding the tracks. Standing behind the box effectively protects us from passing trains (maximum speed here is 200 km/h). From the safety training, I remember that the safe distance to live tracks is 2.2 m, and so I stop around 2.3 m from the tracks, in front of the box. Helge spots where I am standing and tells me: "Hey, come here so you don't get dragged along [by the suction from the passing train]". Shortly thereafter the express train passes at a high speed. Helge turns to me with a smile: "Phenomenal speed isn't it?" (Field notes, August 2000).

This story of people being dragged along by the suction of the passing express train is mythical, stripped of context and strongly structured to support an important message (Steffen, 1997): be careful, there is no escape if you make a mistake; margins are necessary to protect you from inattentiveness or distraction.

In addition to conducting observations and interviews, I organized focus groups with participants from the same trade, for I assumed that the local team had developed common norms for what risks are seen as relevant, what risks you can take, what rules you can bend and when. The focus groups thus represented a situation similar to the way the technicians would have discussed the issues as part of their normal interaction, such as during a coffee break or in the car while traveling to a workplace. I hoped to be able to observe the group dynamics at work in sense making, knowledge transfer, social control, and so forth. I organized four focus groups, one for each trade except for the train drivers in order to get the informants' perspectives on certain issues that had caught my interest during the fieldwork. In each focus group, the participants were three to five members of the same local community. The focus groups took place at the facilities in Midtown, during regular working hours. I used a set of general questions to spark discussion and also asked about their interpretations of specific events that we had all participated in or which they considered relevant and informative.

I typed my fieldwork notes and transcribed the recordings of interviews and focus groups. These data were then transferred to the QSR NUDIST program and coded. The coding reflected themes significant to the technicians, such as "responsibility" and "Mr. Fix-it". It also reflected my emerging analysis, usually in terms of concepts without specific theoretical correspondence, such as "community", "identity", "accepted risk", or in terms of specific events or issues such as "derailment", "incident reporting", and "safety rules". After coding, all the data were retrieved thematically according to the various codes, and the codes were grouped. I then wrote memos about the different groups in order to develop the analysis.

Having observational data as well as data from interviews and focus groups enabled me to compare what I saw with the meaning that informants attached to what they did. Incident reporting appeared as a salient dimension in the tension between the practices prescribed by the safety department and local practices within the occupational communities. The official policies of no-blame, feedback to reporters, organizational learning, and repair of root causes contrasted sharply with the occupational values of responsibility, vigilance, carefulness and the like. This conflict is the major reason why incidents are not reported.

3. Incident reporting, accident etiologies, and repair work

3.1. Central concepts

The central concepts in this article are accident etiologies, incident-reporting schemes, and storytelling. The dictionary defines etiology as a theory of causality. The central dimensions of accident etiology include risk perception, accounting for breakdowns, and repair practices. Breakdowns represent those moments when risk management fails. Repair practices usually involve some kind of lesson learnt, or may involve more radical changes such as the use of new tools and procedures.

Accident etiologies shape what is considered an incident. They also shape non-reporting, as well as what are considered appropriate repair measures after an incident. In this article, there are two competing etiologies: a system perspective and an occupational perspective. Both are emic phenomena, that is, they express the theories of causality adhered to by relevant practitioners. This is in contrast to the researcher's own analysis of causality, which is called an etic theory. Of course, the presentation of the emic etiologies in this text is inevitably also my construct.

The two emic etiologies developed within two different communities. The system etiology originated in scientific discourse, whereas the occupational etiology developed within occupational communities. The two etiologies thus have different rationales and practices. The system etiology becomes increasingly technically sophisticated, standardized and computerized, whereas occupational etiology is reproduced mainly by rules of thumb, tacit knowledge, apprenticeship, habitual organizational routines, and storytelling.

The two etiologies are represented here as "folk models" of accident causality. Neither necessarily represents my own point of view, even though I think both perspectives are relevant to understanding what informs practice. There is a need to reconcile them, as well as challenge them in order to arrive at normative conclusions.

In this article, I will focus on how the different etiologies shape incident reporting and storytelling and how the occupational etiology in turn is reproduced through those same practices. I will also give a brief overview of the practices and ends, as well as the consequences, of storytelling.

3.2. Balancing system and occupational risks

Railways are socio-technical systems, comprising technology, actors and organizations inextricably interwoven in a seamless web of interacting and mutually shaping components that influence everyday management (Hughes, 1986). There is a high degree of interdependence between technology and human action, and also between people in various occupations and in various places, which creates a requirement for coordinated action. System functionality is a function of this interdependence. If one component is changed, other parts also need to be changed in order to make the system work as intended. In addition, system complexity and interdependence imply both an elaborate division of labor and a need for coordinated actions. Thus train drivers and conductors operate trains, which are routed over the network by train dispatchers, who also coordinate train traffic and work on or near the tracks.

Railway technicians support safe and timely transport by maintaining the railway infrastructure. They inspect, maintain, repair, and construct rails, embankment, signals, the telecommunication system, and the electric power supply. Their work necessarily exposes them to occupational hazards. Thus, the technicians face a double-order risk in their work: they are assigned to serve others' safety and are exposed to risk themselves. To do their work, they need to balance their own safety against other requirements such as on-time trains, time limits, and economic limits while they also have to address their own desire to have a good time, enact desired identities, and so forth. Balancing is achieved through corporate resources such as planning and procedures, but also to a large extent by relying on occupationally-based practices, skills and values. Balancing is an important concept, for it stresses the multiple demands put on technicians' practice as occupational safety is traded against other demands. Multiple demands and the priority of requirements other than occupational safety are reflected in their ways of addressing incidents, including the construction of accident etiology and the practice of storytelling.

3.3. System risks, breakdowns and incident-reporting schemes

Risks are inevitable features of the normal operations of a hazardous, complex and tightly coupled system (Perrow, 1999). This means that safety is an achievement, accomplished through active and purposeful organizing to overcome hazards (Roberts, 1993; Gherardi, 2004). These organizing processes are based upon a specific understanding of hazards and the appropriate means of addressing them. Continued safe performance seems to confirm that this understanding is correct and that the means are appropriate. Consequently, an accident is "a breakdown or misalignment in what hitherto was a way to order heterogeneous materials" (Gherardi, 2004, p. 64). Thus, breakdowns represent a failure to manage hazards in terms of the cultural frame of understanding both risks and the means to manage them. To prevent future accidents, there is a need to learn from and "repair" understandings of risks and responses in terms of technology, organizational structure, economic incentives, organizational routines, training, and the like Turner and Pidgeon (1997) and Reason (1997). Incidents are seen as precursors to accidents, which could have evolved into accidents had a number of other conditions been in place (Heinrich, 1931; Suchman, 1961; Perrow, 1999). Accident causation is also separated from injury, so that even crossing a red light without injury is considered an accident since it involves a failure to manage the situation at hand. Thus, the focus is on breakdown or control failure, rather than on injury or damage (Suchman, 1961; Hale and Hale, 1970). This perspective makes it possible to uncover and possibly repair underlying, latent errors, rather than focusing on the obvious injury. Incident-reporting schemes are often presented as valuable means to collect the data needed to make such repairs, making it unnecessary to learn from accidents (Iedema et al., 2006). This is why it is important to understand why these schemes often fail to meet corporate and regulatory expectations.

Conceptually, an incident-reporting scheme can be regarded as an example of organizational communication that aims at organizing the production and distribution of information and contributes to making sense of events that take place in the organization, or which are regarded as having a significant impact on the organization (Coan, 2004).[4] It is a way of institutionalizing and formalizing organizational communication and learning. Incident-reporting schemes reflect a systems and managerial perspective in terms of accident etiology, data collection, and analysis, as well as in terms of repair work. In addition, regulatory agencies require that corporations establish and run systematic programs to improve safety.

Incident-reporting schemes have been widely used in aviation for a number of years. ASRS, the US Federal Aviation Administration scheme, has been in place since 1976 and has provided ample opportunities for learning from mistakes and from inadequate technology and operating procedures. Many incident-reporting schemes permit incidents to be reported anonymously. In the ASRS, filing a report provides immunity from punishment for infractions of FAA rules. More than 10,000 incidents have been reported (Coan, 2004). The success of the aviation-based schemes has inspired incident-reporting schemes in medical practice, in the railways, and in off-shore activities (e.g., Rooksby and Gerry, 2004; Johnson, 2002; Vinnem et al., 2006). However, significant non-reporting of incidents has been identified as a major obstacle to organizational learning through incident-reporting schemes, and has become a research topic in itself (e.g., Bridges, 2000; Johnson, 2002; Waring, 2005).

3.4. The social shaping of non-reporting: articulation and social sanctions

Incident-reporting schemes often show low reporting frequencies (Bridges, 2000). There are both pull and push reasons for non-reporting. To start with, there is a need to categorize or articulate an event as an incident. Occupational etiology often does not support the articulation of events in the same way as safety officers would. Also, incident reporting often involves social sanctions that make people reluctant to report events that actually deserve to be reported (Mancini, 1998).

In occupational discourse, events are often only identified as significant and requiring structural repair when there is a breakdown that results in injury or gives new insights. Unless it is recognized that there is something new to be learnt, an event that does not cause an injury is dismissed as a "whoop", that is, "a mere

[4] It is also a means to measure and control the organization, in terms of quality management.

local hiccup that temporarily ruffled an otherwise smooth operation" (Dekker, 2003, p. 74). A whoop is an exception to the rule, not a breakdown, and thus there is no need for the evaluation and repair of practices that a breakdown would require. This is illustrated in the study by Van der Schaaf and Kanse (2004) in which 21 employees at a chemical plant in the Netherlands that is characterized as a "no-blame" organization were asked to fill out a small form for every case where they realized that they had been exposed to a self-made error. Thirty-three events were reported, only five of which would have been reported through the existing scheme. The failure to report the other events was not attributed to being ashamed or afraid of the consequences. It was rather that four of the events were categorized as recoverable events, five as not involving any learning, 10 as having no enduring consequences, and a further 10 as not being relevant. There was thus no perceived need for repair. In addition, employees may also not report incidents because they are ignorant of what constitutes an incident as opposed to a non-incident (Bridges, 2000).

Recovery and non-injury is the basis for normalization of deviance (Vaughan, 1996). Recoverable events are classified as non-events, and those that do not cause injury or damage are trivialized as manageable, normal problems (Garfinkel, 1967). Normalization of deviance means that actions that should have been characterized as anomalous, errant, and significant signals of danger since they might cause accidents under certain circumstances are constructed as normal, accepted practices that do not require any repair. They are thus left as latent failures in the system (Vaughan, 1996). Normalization of deviance can also follow an occupational rationale. In physicians' discourse, some errors are seen as inevitable and even beneficial for the education of younger doctors (Waring, 2005). However, the notion of the inevitability of errors can be regarded as a "collective rationale to bolster individual self-esteem and safeguard against feelings of incompetence" as anyone can make a mistake (Waring, 2005, p. 1931). Unfortunately, this attitude can also lead to errors being "normalized", with the result that reporting them is seen as a pointless waste of time, and that the subsequent need for structural repair is dismissed.

Employees also often fail to report incidents for reasons related to the social sanctions that the reporting itself may bring and the social context of incident reporting and feedback. There is often resistance to managerial intervention that threatens occupational autonomy and judgment. This resistance is not surprising considering the social circumstances of incident reporting, which are shaped by employees' meaning making, supported by their previous experiences. A literature survey by Van der Schaaf and Kanse (2004) revealed that employees do not report incidents for a number of reasons: categorization of incidents as part of the job, especially among blue-collar workers in macho industries; fear of colleagues' teasing and supervisory reactions such as disciplinary actions; attribution of responsibility, blame and shame; fear of legal sanctions; and lack of management commitment and feedback or follow-through after incidents are reported.

Issues of blame are addressed in several dimensions: in cultural theory, blame for risk-bearers is a device for exclusion from the community to protect it from outside contamination of unfit members (Douglas, 1992). In symbolic interactionism, a blameworthy action represents failure to contain risk and thus a breakdown of practices that supports participants' "face" or claims for a certain identity (Coan, 2004, drawing on Goffman, 1967). In clinical medicine, incident-reporting schemes are often seen as external to occupational practice, challenging occupational discretion and judgment (Waring, 2005; see also Allsop and Mulcahy, 1998). Doctors not only fear revealing flaws in professional competence and ability but that reporting will inhibit career development. They distinguish between mistakes and incompetent actions, where the former are seen as excusable. However, incident reporting is seen as a managerial exercise which risks missing the correct distinction between those two categories (Waring, 2005). Instead, practitioners turn to storytelling, for reasons that seem natural given the occupational experience.

3.5. Storytelling: reproducing self, community and local etiology

Non-reporting of incidents is also due to competition with occupational storytelling both in terms of organizational learning mechanisms and in terms of content. Storytelling is based upon occupational accident etiology and so it is locally rational, integrated into occupational practices, and seems to serve technicians' needs in terms of repair. Stories such as illness stories also serve other purposes, including identification and community (Frank, 2000).

Telling stories of incidents and accidents is necessary for sharing knowledge about recent events and what one might appropriately learn from them (Weick, 1995; Sanne, 1999; Smith et al., 2003). Storytelling is not restricted to appropriate procedures though; it also extends to the moral and emotional dimensions of unfortunate event such as accidents, incidents, and illnesses. Unfortunate events represent and symbolize breakdowns in the normal, prescribed, and anticipated order of things in the world. Frank (2000, p. 355) argues that since illness demoralizes, people tell illness stories to "recuperate[s] persons, relationships, and communities". This is true also for individuals, for whom storytelling may be a means to sustain or repair a relational self that is threatened by the crisis that the unfortunate event causes. Recuperating an acceptable identification is a way to explain what seem to be unaccountable failures in socially acceptable terms, thus saving face.

As seen in a study of Anonymous Alcoholics (Steffen, 1997), storytelling is also shaped by and shapes meaning making, including etiology, within the community in which the story is told. Apart from being instructive in terms of occupational protection, stories also serve many other interests such as enhancing occupational claims to responsibility, autonomy, and pride. Indeed, storytelling is an integral part of the (re)production of occupational communities: An occupational community is "a group of people who consider themselves to be engaged in the same sort of work; whose identity is drawn from the work; who share with one another a set of values, norms and perspectives that apply to but extend beyond work related matters" (Van Maanen and Barley, 1984, p. 287). Since storytelling is shaped by many other interests than occupational health and safety, accident etiology is also framed by other concerns within occupational discourse.

Storytelling shapes practice and constrains what may be learnt. Thus, storytelling is always biased toward one purpose, although most stories have multiple readings. In medical practice, errors are constructed as being caused by the uncertainty of the medical process, mistakes committed by others, or external circumstances beyond the doctors' control (Allsop and Mulcahy, 1998). Storytelling about complaints serves as a way to gain collegial support and understanding as protection from a hostile attempt to intervene in their practice. Some stories tend to become standard stories, reducing context and restricting interpretive flexibility. These stories serve a single purpose, biasing storytellers and listeners within the community to experience things in certain ways rather than others, impeding articulation of certain events, and thereby conserving practice and reproducing occupational rationales and community, as was seen in a study of mental care (Abma, 1998).

Occupational accident etiology in railway maintenance is based on a specific occupational discourse and on current constraints in terms of theoretical concepts and knowledge. Occupational etiology includes emphasizing vigilance, carefulness, claims to occupational responsibility and autonomy, and the like, and de-emphasizing structural, systemic features of accident causation. Historically, railway companies spelled out employees' unconditional personal responsibility to attend to both the punctuality and safety of trains (Hasselberg, 2001, pp. 28–29). These values were taken up by the occupational communities and transferred through apprenticeship (e.g., Lindmark, 1991; Lindvall, 1980). From this perspective, an accident is seen as a breakdown of occupational practices, skills, and values, rather than as a system breakdown. Technicians' group accident causes into five categories: knowledge, attitudes, practices, human factors, and contingencies. The first three of these categories are negatively related to the skills, practices, and values developed and honored in the railway technicians' occupational communities, while the last two are considered to be beyond the team's control and are thus excused. Knowledge, attitudes, and practices are linked with means of addressing risks, including issues of occupational pride and responsibility. Failing to live up to these skills, practices, and values implies a failure to live up to the standard of a competent and responsible technician, potentially threatening the technicians' face and their place in the team.

3.6. Summary

In the next section, I will analyze three stories of occupational mishaps. I will analyze how breakdowns are accounted for from an occupational community perspective: what is seen to break down, what is said to have caused it, who or what is to blame, what can be learnt, and what kind of repair is required. This analysis will help to explain why these breakdowns were or were not reported. I will draw upon concepts within occupational accident etiology: breakdowns, blame, shame, injury–recovery, appropriate learning, and normalization of deviance. As a contrast, I will also make a comparative analysis from a system perspective, identifying the possible root causes and adequate repair work for each case.

4. Three stories: accident etiologies, reporting practices, and repair work

The railway technicians' relationship to the incident-reporting scheme is interpreted through three stories of mishaps related to occupational hazards experienced by Stellan, a signal technician. In all three events, practices supposed to ensure safety broke down, and in all three he and other people were close to or very close to an approaching train. The first event was reported, but the feedback was not what Stellan expected. The other two events were not reported, for different reasons. I seemed to be the only one characterizing the third event as a breakdown.

4.1. Different etiologies and discouraging feedback

Samuel and Stellan were called out to fix a "track circuit failure" at Norrby station. The track circuit connects the two rails in a track with each other through the ground in a geographical section. When a train is on the tracks, the electrical resistance is reduced and the circuit is closed. The signals are then automatically set to the stop position in order to protect trains from each other. The circuit can also be closed by a technician applying a short-circuit clip between the rails. This is done when a team requires "exclusive track occupancy" or "green zone working". The technician negotiates with the dispatcher to close off the section where the technicians will work, asking for a possession of that section. The dispatcher will then put the signals and transponders to the stop position, keeping trains out of the section. A closed track circuit is indicated on the dispatcher's monitor. A track circuit failure occurs when a track circuit is indicated as closed but the closure does not correspond to traffic or to exclusive track occupancy.

When technicians try to find a track circuit failure, they cannot use the short-circuit clip since this would prevent them from finding the failure. So instead of relying on short-circuiting, they rely on the dispatcher to set the signals to the stop position. In the following story, this protection failed, but the technicians' explanation of the failure differed from that of management and the resulting feedback had a discouraging effect on the technicians' future willingness to report.

In January 2000 at 7 PM, Stellan and Samuel are called out to fix a track circuit failure at Norrby station, quite close to Midtown.[5] When approaching Norrby station by car, Stellan calls the dispatcher in charge of the section, asking for more details. The dispatcher replies:

> "Yeah, I had a train which suddenly had to stop in front of [signal] 173. There was no one occupying the tracks and no train path was programmed beyond the signal."
> "Ok. We are on our way out; we just passed Midtown station right now."
> "Great. Keep in touch."
> Samuel and Stellan drive to Norrby station. The time is now 7.30 PM and the track circuit failure has been in effect for around 1.5 h. This time of day is very busy: a small decrease in the number of passenger trains is compensated for by an increase in the flow of cargo trains. Trains pass by in both directions but with reduced speed in the faulty track section. Norrby station is an important railway junction on one of the major trunk lines with a high traffic flow combined with an inflexible design that reduces capacity. These circumstances increase vulnerability to disturbances as well as their consequences. Even though both tracks are in use, the reduced speed decreases the traffic flow and thereby delays the traffic.
> The technicians bring a resistance meter and a hammer and walk along the left track, towards the signal, on a double-track section. As experienced technicians Samuel and Stellan take shortcuts to shorten the search time and decrease the delays. They had investigated another instance of track circuit failure at the same place recently, and they suspect that this case may have a similar cause. Thus, they do not perform a lengthy systematic search, but instead begin by inspecting the usual suspects. When they reach the track circuit closest to the signal, Samuel begins to inspect the rails: a track circuit failure can be caused by a broken rail. A train passes on the other track, coming towards them. Stellan walks in front of

[5] This story has been compiled from different sources: observation protocols, Focus Group 2, interviews with both Samuel and Stellan, a site visit and two incident reports (written by the train driver and a Banverket safety officer).

Samuel and knocks on the rail close to the ground connections: he knows that rocks sometimes make contact with the wires, causing a short-circuit and thus a track circuit failure.

Constant noise from the nearby highway makes it very hard to hear the trains. Suddenly, Samuel notices a bright light behind him: "They really come fast here". He suddenly realizes that a train is approaching at normal speed and is very close to him and Stellan. "Look out!" he yells. "The train is coming!" As he shouts, he leaps into the ditch to the left of the tracks. Stellan is caught by surprise and jumps to the right, between the tracks, exposing him to another danger: jumping towards another 'live' track may place him close to a train on that track. Fortunately, neither Stellan nor Samuel is injured.

Stellan calls the dispatcher. The dispatcher tells him that the track circuit failure suddenly disappeared, and he therefore removed the speed restrictions that he had imposed on trains passing that point. It is not unusual for track circuit failures to disappear as suddenly as they appear. The dispatcher did not notify Stellan and Samuel about lifting the restriction since he was waiting for them to call him before they started walking towards the faulty section. He expected them to request more details in order to localize the error and to ask for protection measures, as they often did.

There is a large discrepancy between the occupational construction of accident etiology and learning from this incident and the corporate one, a discrepancy which probably has a major discouraging effect on incident reporting. Stellan tells the story of the incident with high feelings, attributing it to two major circumstances which are also connected to insights that he conveys to his team. First, he and Samuel had been "over-eager" in trying to find the error. Over-eagerness is the reason why they forgot to communicate with the dispatcher when they entered the tracks and also why they forgot to protect themselves in other ways in a secure fashion. Stellan attributes their over-eagerness to their willingness to find and fix the fault as soon as possible in order to get the trains running again, which is a salient part of technicians' occupational pride and their sense of accountability towards the traveling public. Thus, he learnt, and through his story the whole team learnt, that over-eagerness represents a deviant, dangerous practice when the balance shifts too much in the direction of train punctuality and threatens occupational safety. Second, the communication that Stellan had with the communication with the dispatcher had been unsatisfactory so that he and Samuel were not protected as they thought they would be, and as a result had been surprised by the train. Stellan had expected dispatchers to order trains to travel on the faulty section at very slow speeds and the dispatcher had expected Stellan to call him back to ask about details for the fault. Stellan and the team were reminded that unclear and missing communication with the dispatcher is a major underlying cause of incidents and accidents.

Samuel and Stellan reported the incident to their employer because it was a horrifyingly close call, because they thought it involved significant learning opportunities, and because they held the dispatcher partly responsible for the incident. However, the management response dismissed their initiative and concerns, as well as the potential for organizational learning from the incident. Stellan's conclusions that they had been over-eager and that there had been poor communication with the dispatcher were ignored. The dispatch center did not investigate the issue at all since they completely denied any contribution.

A safety officer for the network owner sent me his brief report on the case. To him, it was a simple case, involving neither a communication error not a misunderstanding, but simply a breaking of the rules. Samuel and Stellan should have negotiated exclusive track occupancy with the dispatcher for the section in which they were about to work. The safety officer reports that he also asked Samuel and Stellan whether they "knew the relevant regulations". This response is defensive and disciplinary, tries to minimize corporate responsibility, and transfer it to the victims. Yet in this case Stellan's conclusions were actually less limited than the corporate response, pointing to root causes and to valuable lessons to be drawn.

The safety officer prematurely closed the investigation of the reasons for the incident. It was convenient to ascribe it to rule breaking. Rule breaking was evident, and the repair was easy since it did not require any structural repair for the employer, the dispatch center, or the network owner. It cannot be denied that rules were broken and that following them would probably have avoided the problem. Nevertheless, deficient communication between technicians and dispatchers is also a widely attributed cause of incidents, and was seen by Samuel and Stellan as the major cause. Given the nature of the incident, investigating the communication would have yielded legitimacy to their concerns and their moment of horror, as well as yielding insights

concerning future communication. The potential for structural repair suggested by the system perspective in which incident reporting is placed, was lost for this and other similar cases.

Other stories confirm that poor or inappropriate feedback from reported incidents discourages technicians from reporting further incidents since the scheme does not seem to serve their interests or concerns. In relation to another close call story, the signal technicians said that they never got to see train drivers' reports on incidents when drivers fear that technicians have been hit by the train or have been in great danger. Stellan argued that it would be good to read train drivers' reports on such events as a way to "see how they perceive the situation". Other groups of technicians complained that they did not get to read incident reports, not even the reports on events in which they had been involved. It is quite common for train drivers to sound their horns at technicians, since from their perspective the technicians seem to be in danger of being run over. Technicians know that the tunnel vision caused by the speed of the train and the curvature of the track at some locations distort the drivers' vision so that it looks as if technicians are in danger even when they are not. Consequently, technicians hail the drivers to acknowledge that they have noticed the train and that they are all right. But technicians would be happy to learn more about how they could behave to reduce train drivers' anxiety when approaching technicians working close to the track where trains are running. Incident reporting sometimes brings negative feedback. Helge, a high-voltage technician, tells a story of when he filed incident reports due to near-misses. He had been told by a supervisor that a specific track was not occupied, but when he arrived there, he found that it was. His railcar almost collided with a rail bound tractor. The supervisor was temporarily taken out of service, grew angry at Helge, and harassed him. These stories tell us that corporate action or non-action contributes to non-reporting. However, in the next case, it is the occupational rationale that causes non-reporting.

4.2. An embarrassing incident with limited learning

The second breakdown involved a fairly close call. It was not reported because of embarrassment about the actions of Stellan and his companion Simon, as well as evolving circumstances after the event. Stellan and Simon had been assigned to straighten cabinets containing signal system components. The leaning cabinets were located along the tracks but stood 2.3 m from the nearest rail, just outside the danger zone. Simon was employed at another workplace and did not participate in the focus group (Focus Group, February, 2003).

> STELLAN: There was an incident where they [managers] don't know who it was. I and another person were out on...and the location was wrongly determined...and we were not there...we had we had not been given exclusive track occupancy.
> ETHNOGRAPHER: But you were there?
> STELLAN: We were at a location.
> ETHNOGRAPHER: At a location yes.
> [General laughter]
> STIG: Yes...and...
> [Someone coughs artificially and loudly, several laughs].
> SIXTEN: Turn off [the tape recorder].
> STELLAN: Turn off.
> ETHNOGRAPHER: No, but it is...
> [General laughter]
> ETHNOGRAPHER: We can see that...
> STELLAN: Well but what the heck...then [a manager's name] and these other [supervisors] went up there in their cars...[first they] came in and then it became like "there is supposed to be some measuring technicians out there that have...stuff has been overrun"..."Aha"...I kept my face /.../ well he probably went right through...then I realized that it was all about what had happened to us.

Stellan and Simon had straightened the cabinets with lashing straps that they attached to a point on the opposite side of the tracks. The straps thus crossed the tracks. According to Stellan, Simon had pulled the straps over the tracks instead of under them.

STELLAN: Then when he straightened the straps... You thought you had good visibility out there you know but there was like a hill where you did not see... and suddenly the train arrived and he [Simon] threw himself under the cupboard and I threw myself to the side... At this moment when we are laying there the fucking straps comes flying you know... But it all went well... anyway... so there was no danger.
ETHNOGRAPHER: No... it went well... but it could have gone bad since you did not see the train either.
STELLAN: No, it came very fast it did.
ETHNOGRAPHER: Yes... would you... you don't want to classify it as an incident?
[Pause]
STELLAN: No, it did become that way... I don't know why [laughs] you don't want to... simultaneously you were a little bit ashamed... it was stupidly done too...

If technicians work in the danger zone they should be protected by either a watchman or exclusive track occupancy. A watchman warns his colleagues of approaching trains so that they evacuate the tracks. In addition, any work that impinges on train safety should be protected through exclusive track occupancy.

This incident is ascribed to Stellan and Simon's failure to frame their work appropriately and creates the possibility of losing face and exclusion from the team. In the focus group, different approaches to explain the non-reporting of the incident are employed, including ways which address potential threats to face and exclusion. Stellan and Simon should have negotiated exclusive track occupancy with the dispatchers since they were working in the danger zone and since their work also affected train safety. They did not recognize the limited visibility and they organized their work in a sloppy, unreflective fashion. Their actions constituted a failure to adhere to the occupational norms of carefulness, conscientiousness, and responsibility. Thus these actions posed a threat to their identification or face as responsible and careful technicians and their claims to membership in the occupational community (Douglas, 1992; Goffman, 1967). The embarrassment at the incident is also shared by the team, as shown by their calls to turn off the tape recorder and their joint effort to explain to me (not included in the extract) why Stellan did not report it. The team helps Stellan to reclaim face by describing it as a "whoops", a shameful but non-representative event, and by externalizing the major responsibility for the breakdown to Simon, who was not part of their team and who was about to leave his job – thus exclusion was already on its way. Here, storytelling and listening served to recuperate Stellan's relational self (Frank, 2000).

In this case and many other similar near-miss stories, learning is restricted by the inappropriate framing of the situation as due to known causes in their etiology of accidents. The team makes significant efforts to downplay the significance of the event through recourse to non-injury and to the lack of new knowledge to be learnt. Repair is restricted to avoiding incompetent companions, being careful, and reflective. Thus, blame does not exclude learning: instead it directs learning to attitudes and rules of thumb that are useful when out "on the tracks", assigned a task and exposed to dangers. It should be stressed that it is indeed rational for the technicians to focus on norms such as vigilance and carefulness. Because they are usually not included in the wider decision-making that conditions their work "on the tracks": they are left to address risks with the resources at hand in any given situation (Peterson and Wingqvist, 1982). Unfortunately though, this restricted learning does not address systematic errors. The official idea of organizational learning through incident reporting is not well understood by the technicians. Indeed, when I explicitly asked about this, Stefan, a signal technician, replied that he had not thought of this aspect at all. System-based etiology is not a tool that technicians usually use to make sense of incidents, apart from some epidemiological knowledge of contributing causes, as in the first story.

From a systems perspective, the cause ascribed to the incident would have been similar to the occupational one: inadequate risk analysis and inappropriate protection measures. However, the event would not, at least in theory, have been associated with blame. Instead, reporting it with a focus on organizational learning would have helped other technicians, who did not have the opportunity to listen to Stellan's story, teaching them what might happen in similar cases, without having to experience it for themselves. Knowing that others make similar mistakes would also create an understanding that making mistakes is perhaps somewhat shameful, but in such a hazardous context, it is better to report them for the benefit of others, rather than to hide them. Additionally, had similar events been reported previous to this one, Stellan and Simon might have avoided it.

4.3. Normalizing deviance and saving face

Technicians usually claim to have enough skill to manage risk. Their experience seems to support this claim, since they are not usually involved in accidents: there is recovery or no injury or damage. This experience is the basis for normalizing breakdowns as ordinary, unproblematic practice, not requiring learning or other repair. The following story gives an example of a normal breakdown without injury, which therefore is not articulated as an incident:

> I am following Stellan and Sven who are to place temporary transponders and speed restriction boards on a single-track location where the tracks are out of position: the transponders and signs will be in use until the track is repaired. We drive to the rural station where the temporary speed limits will be placed. We unload the material and carry it with us, walking along the tracks: Stellan and I walk close to the rails. Suddenly Sven calls out: "A train is coming!" and Stellan and I evacuate the tracks. Perhaps 10 s later, the train passes us from behind (10 s is the time margin for the lookout man rule). Stellan seems surprised by the train: after having overheard Sven's phone call with the dispatcher, he had expected another train in the opposite direction a little later. I tell Stellan that this was a close call, and then I correct myself, saying it was the closest call I had experienced so far. Stellan tells Sven about our conversation later, but argues that he has had closer calls in the past. Sven knew about the train from his conversation with the dispatcher but had not told Stellan and me about it. Stellan thought that the dispatcher would have ordered the trains to reduce speed (Field notes, September, 2002).

This incident involves a breakdown of anticipation and control. Therefore, it is potentially shameful because it indicates that Sven managed the danger inappropriately and did not inform us correctly about the situation so that we could be prepared for the approaching train. The event creates an opportunity for mistrust in Sven's competence and for others to blame him. However, non-injury makes it possible to explain away the potential threat to face as a normal practice through normalization of deviance. When we talked about the incident in the car, Stellan defended his colleague. He argued that on a day like this – when it was not winter and there was only a little wind – it was possible to *hear* the trains coming. Had there been snow on the ground, it would have been necessary to arrange exclusive track occupancy, for the tracks run through a deep trench and there is also a bridge that inhibits visibility in one direction. Stellan's defense could be seen as saving his colleague's face by normalizing deviance.

I remembered this event, but when I asked about it a half a year later in the focus group, Stellan had trouble remembering it (Sven did not participate). When reminded, Stellan focused on aspects other than the sudden arrival of the train. The breakdown seemed not to worry the technicians since it did not cause any injury: "all's well that ends well". Indeed, non-injury makes it possible to deny that there was a breakdown at all. Since there was no breakdown and thus no failure, there is no need for learning or other repair work. In fact, it was my presence that articulated the event as a potential problem: Sven would not have needed recuperation had I not been there, since both technicians normalized the event as in-significant, normal practice. I challenged this notion by articulating it as a breakdown, provoking an account that would reassert the appropriateness of Sven's actions.

The normalization of this event in occupational etiology is problematic. Sven and Stellan did not attribute much significance to the event because there were enough margins and no injury and similar events had happened before, also without injury. It was a hiccup, and an acceptable one. Thus there is an acceptable risk involved in such a loss of control, although it is a little bit embarrassing. There was no risk of being hit by the train, even though trains were not running the way Stellan expected, which reduced the time for us to recognize the train before it came rather close to us. The lack of injury confirmed that their practice was safe and appropriate.

In occupational etiology, attention to an event is thus dependent on the severity of the consequences of the event, rather than on the causes and possible consequences of the breakdown of anticipation and control. By contrast, in a system-based etiology, the breakdown itself would have been the focus of interest and the event would have been ascribed to failure of control. Correspondingly, repair work would have focused on the underlying latent errors such as insufficient protection due to inappropriate risk analysis and a failure to establish mutual understanding and appropriate protection measures between Sven and the dispatcher. Reporting

this and similar events would have contributed to an understanding of their frequency and perhaps of how often they involve closer calls, that is, what the margin of safety might be. It could help to estimate the risk involved and to repair the root cause, that is, to reverse the normalization of deviance in this and similar cases. The potential consequences could be highlighted by articulating it as a breakdown and by pointing to variables that might reduce the margins if some of the contingencies changed slightly. Reporting the event could have resulted in suggestions of measures that could be taken to prevent a recurrence of this kind of situation. Reporting the incident and getting other similar reports would also, as in the previous case, encourage others to tell their stories and thus change occupational etiology.

5. Conclusions

The supervisor in the workplace meeting referred to in the introduction was partly right: there should be many more incidents than accidents according to the widely shared notion of the iceberg relationship between the ratio of incidents to accidents. But rather than moralizing over non-reporting, he should focus on the reasons why incidents are not reported. One major reason is a sense of shame. The other reason is ignorance about the use of incident reporting. The reasons why some incidents are perceived as shameful and all the other reasons for not reporting incidents should be investigated and changed.

The low frequency of reported occupational incidents in railway maintenance is mainly due to the attractiveness of the competing scheme, storytelling, for reasons of both pull and push. I will summarize the major conclusions drawn from the three stories told here, relate these conclusions to similar findings in previous studies, discuss the major implications for organizational learning from incidents, and suggest means to overcome the obstacles to learning and for structural repair.

Incident-reporting schemes and occupational storytelling are both similar to and different from each other. Both are means for organizational communication (Coan, 2004). They differ regarding accident etiology, ownership of the different schemes, and who seems to benefit from them. The system-based accident etiology that underlies incident-reporting schemes usually conflicts with railway technicians' accident etiology in terms of the concepts of breakdown, lessons learned and what motivates organizational learning. Among the reasons incidents are not reported is that many are not articulated as events needing reporting: this group includes incidents that do not include injury, which don't seem to include new knowledge, or which are not even regarded as incidents. Non-reporting is also attributed to the social sanctions of reporting, which include shame, blame, and disciplinary actions. Storytelling may also have other purposes than system-wide organizational learning: learning for the local team and reproducing occupational culture and community, including accident etiology as well as organizational relations and recuperating a self in crisis after face-threatening incidents.

Storytelling is indeed an attractive practice for the technicians: for transferring learning from incidents, as a means to reproduce selves and occupational communities, as a means for apprenticeships. It provides valuable knowledge also for the researcher as it contextualizes technicians' practices and how they make sense of different events. Unfortunately, technicians' accident etiology prevents them from recognizing the benefits of incident reporting in terms of organizational learning and structural repair that might prevent similar future incidents. Stories are foremost a device for the occupational community in which they are told. They are told about events that seem memorable and worth telling, and they are structured according to the practitioners' own script. Their distribution and the learning involved belong to the community. The learning is integrated into the participants' cultural frame and suited to their daily needs. By contrast, the incident-reporting schemes and the data in them are the property of the employer, structured by the employer, and available for use by the employer. Moreover, the incident-reporting schemes are not integrated in the technicians' practices and are not trusted by them because of their experience of poor or inappropriate feedback. Thus technicians' storytelling has proved to be better integrated with their practice and seems to serve their interests better than the incident-reporting scheme. Unfortunately, however, storytelling is usually restricted to local practice and does not address the systemic or root causes behind accidents and incidents.

Shame and blame are often stressed as the major reasons for not reporting incidents. However, there are also other culturally-based reasons for not reporting (Waring, 2005). In addition, practices of shame and blame need to be contextualized within the occupational community. Attributing responsibility to local

practice is an important part of technicians' repair work, as is local, situated learning: be knowledgeable, careful, attentive, conscientious, and so forth. These repair practices are rational for three reasons that are connected to both the pull and push characteristics of non-reporting: knowledge, power and identification.

First, non-reporting is based upon technicians' knowledge and occupational etiology. If technicians do not know about other technicians' failures they may not understand what they can learn from reporting their failures. Technicians also seem to miss a system perspective in their understanding of accident causes. That is, they cannot link different items in a causal chain in the same way that experts do. They do not have the important tool that a systems perspective provides as well as the system knowledge of accident causality that experts have. Yet their occupational etiology is locally rational since it is based upon their experience and their conceptualization of that experience.

An interesting parallel can be made to the analysis of folk etiologies within medical anthropology. Traditionally, folk etiology of illnesses has been attributed to religious beliefs involving such things as witchcraft or ritual pollution. However, pollution may be of different kinds and may evoke different etiologies used interchangeably (Jewkes and Wood, 1999). In addition to religious beliefs, people make sense of what they see and what seems to work as a remedy for disease. In an anthropological study of vitamin A deficiency in Niger, residents in a Hausa community had arrived at similar conclusions to clinical medicine when symptoms and remedies were closely and visually linked. In other cases, deviance between medical and everyday etiology was attributed to the need for medical instruments to establish such a link (Blum et al., 2004). A similar argument can also be made for the railway technicians. They lack the instruments required to recognize the importance of system and organizational learning perspectives and corresponding repair practices. Occupational etiology reflects technicians' ignorance about such concepts and how they might contribute to improving their safety.

Second, occupational etiology is the only means by which the technicians can improve safety on their own, due to their limited access to system-wide design and operating decision-making, involving personnel resources, training, work organization, and planning. Rather than gaining from reporting, they seem to lose when they do it, since they receive very little feedback, and much of the feedback they do get is negative.

Third, these practices are also comforting because they don't challenge the technicians' trust in the basic safety of the system or in their own competence. Failure is explained away as a one-off happening that is not typical of the system or of the technicians' normal practice, or as a manageable error that does not constitute a breakdown. Technicians save face through recourse to normal practice, involving uncertainty, and inevitable errors, in much the same way as doctors do when they respond to patient complaints or do not report errors (Allsop and Mulcahy, 1998; Waring, 2005).

There are important drawbacks to using storytelling for learning from incidents. These drawbacks derive from the occupational etiology that frames the stories as well as from the social consequences of other purposes of storytelling. Some stories may be urban myths, though they sometimes serve occupational health and safety. This is said to be the case with the technicians' notion that the wind draft can pull one towards an express train if one stands too close when it passes by. Such a story helps to instill a necessary respect for the speed and power of moving trains and the need to keep an adequate distance away from them. Although the facticity of this story is contested, it is especially helpful when dealing with disoriented and inattentive apprentices, ethnographers, or other visitors. Other myths may not serve learning that well if they are based on false premises.

Moreover, since stories are often told as a way to justify and legitimize technicians' practice, stories are biased towards benefiting technicians' and illustrating the incompetence of others, such as dispatchers, train drivers, and supervisors. Some stories become standard stories that tend to reproduce social relations, practices, and identities rather than teaching something new or important with regard to structural repair to prevent future accidents. Such stories are the backdrop of claims to occupational responsibility and autonomy. Stories become strongly structured, stripped from their context, and capable of only a single interpretation, rather than providing food for thought about alternative interpretations and structural repair. Abma (1998) describes a similar situation in regard to the care of mental patients, where the standard stories inhibited improved care as they focused on risks and problems rather than on the patients' constructive capacities. In an organization like *Banverket Produktion*, incident stories often reflect deep-seated distrust between departments and between supervisors, experts, and employees on the line. Certain stories will be told and

others left untold, or stories will be biased toward certain kinds of conclusions. Technicians tell stories about inadequate planning or lip-service to safety slogans that confirm that technicians can trust only themselves for occupational protection. Such stories confirm their own competence, social importance, and vulnerability, while ridiculing management and reducing incident reporting to "another form to fill out". Standard stories will tend to develop and strengthen adversarial relations, to the detriment of mutual communication and improved safety.

Thus storytelling is necessarily biased and may not always serve occupational safety. This is, of course, also the case with a system etiology, but such an etiology is nevertheless also a necessary component of preventive, systematic occupational protection. There is a need to tell new stories to develop a common accident etiology that link local experience and knowledge with a systemic and organizational learning perspective. In addition, most stories have a limited audience, limiting the number of people who can learn from them. This is particularly true for stories about similar incidents in areas geographically remote from each other.

As occupational repair practices often derive from attributing accidents to proximal and judgmental causes, they obscure system conditions (Dekker, 2003). This obscuration is a serious concern since high complexity and close interdependence between different occupations, tasks, and organizations within the railway socio-technical system require a scheme that can address the systemic causes behind accidents. To be able to manage a complex safety-critical system, the means of addressing problems has to match the complexity of that system: this is the idea of requisite variety (Weick, 1993). Thus in railway maintenance, accidents that are due to stress or fatigue may be linked to deficient time-planning, performed in offices far away from the actual work, and often prioritizing traffic over track work, making time slots too short for the work required, or scheduling a lot of night shifts (Peterson and Wingqvist, 1982). Occasionally, railway technicians do address system causes, but this approach is quite rare and is not very systematic. In addition, as we see from the first incident reported in this paper, the response of the corporation sometimes disinclines technicians from taking such initiatives in the future.

To make an incident-reporting scheme work, it must be integrated with existing practice in the user community such as storytelling, and it has to address the systemic causes of accidents. The first requirement can be achieved through using existing, occupationally-based schemes. Rooksby and Gerry (2004) compared four different incident-reporting schemes in anesthesia in UK hospitals. Two of them are described here. In the department-wide scheme, anesthetists filled out a form which was distributed among colleagues and discussed during audit meetings when the reporter told colleagues about the event, often adding detail that were not included in the form. The meeting would also discuss what could be done to prevent such an event from recurring. This scheme was successful as it was routinely used and it had a noticeable effect on patient safety since anesthetists were able to use it to solve their own problems. However, only the hospital-wide scheme could cover events that were common to several departments. Unfortunately, the anesthetists felt reluctant to use the latter because it meant that they disclosed their errors to outsiders whom they did not trust to understand the rationale behind their actions. In addition, writing a large number of reports would make the department seem unsafe and put their jobs at risk. Thus, a system-wide approach to repair was not reached.

A system-wide approach to organizational learning and repair from incidents requires using an incident-reporting scheme rather than merely storytelling. However, integration and trust does not come by itself: changing a socio-technical system through introducing an incident-reporting scheme necessitates other changes to make it fit the system. To believe otherwise is to be naive. Thus, making an incident-reporting scheme work requires measures that overcome the obstacles that I have identified here. Bridges (2000) reports the experiences of corporations that have achieved higher than usual rates of incidents reported compared to the number of accidents (in the range of 20–80 incident reports per accident). Bridges argues that a ratio of 20 reports per accident is achievable and is sufficient for effective organizational learning for most companies if they take the necessary actions in response to these reports. He addresses each of the major obstacles to incident reporting.

Fear of disciplinary actions should be addressed through finding the root causes of each causal incident and writing recommendations to fix only those causes. Further, employee incidents could be investigated by peers rather than by management experts and the employees should be the owners of the incident-reporting system. Employees should be able to hold management accountable for fixing root causes. Fear of teasing by peers can be addressed through training in the principles of the incident-reporting system and through feedback with a

system perspective. This approach would give employees the necessary tools to develop their accident etiology and tell new stories. Employees should be trained to understand the harm that teasing incident reporters can cause to the incident-reporting scheme. To make employees understand what an incident is, a simple list outlining examples of incidents and non-incidents and why they are important can be distributed. A number of operations personnel could be trained to investigate incidents, including the identification of root causes. The lessons learned from the incident-reporting scheme should be shared with the employees. Conclusions drawn should be specific and corporate legal advice should be obtained when appropriate.

As noted before, all the incidents discussed in this article occurred before Synergi was introduced. However, when Synergi was introduced, no means were taken to integrate it with existing practices and there were no training efforts like those Bridges suggest. Thus, it should come as no surprise that reporting has not increased.

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