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Subjective theories of organizing and learning from events

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ABSTRACT

The present paper outlines potential shortcomings of analyzing events in high hazard systems. We argue that the efficiency of organizational learning within high hazard systems is at least partially undermined by the *subjective theories of organizing* held by their members. These subjective theories basically reflect an "engineering" understanding of "how a system and its components perform", and are assumed to involve (social-) psychological blind spots when applied to the analysis of events. More specifically, we argue that they neglect individual motives and goals that critically drive work performance and social interactions in high hazard systems. First, we focus on the process of identifying the causes of failed organizing within the course of an event analysis. Our analysis reveals a mismatch between the basic functional assumptions of the event analyst on the motives of social actors involved in an event and on the other hand, the perspective held by the social actors themselves. Second, we discuss the process of correcting failed social system performance after events. Thereby we draw on blind spots that emerge from the direct application of technical safety principles (i.e., standardization and redundancy) to the organization of social systems. Finally, we propose some future research strategies for developing event analysis methods which are aimed at improving an organization's learning potential.

1. Introduction

The present paper focuses on the process of learning from events in high hazard, low risk systems like nuclear power plants or commercial aviation. These kinds of systems are characterized by central planning systems, strong regulation by external authorities, highly standardized work processes and high levels of formalized social roles and responsibilities. The analysis of events within these systems is mostly institutionalized, i.e. conceived of as an integral part of management systems that aim at establishing and facilitating organizational learning processes. For instance, the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety demands the implementation of "self-learning" safety management systems in nuclear power plants (BMU-Press Release, 2007). The goal is to establish a management system that allows for continuous optimization of safety-related behavior. In particular, productive organizational learning should emerge from recognizing procedural non-compliance as well as organizational and technical failures at early stages.

However, previous analyses of major events in high hazard systems reveal that organizations often fail to learn from events. For instance, a report from the Swiss Federal Nuclear Safety Commission summarizes results of recent event analyses in nuclear power plants (e.g. events in NPP Davis-Besse or NPP Phillipsburg) with respect to failures in organizing (KSA-Report No. 07-01, 2007). One crucial feature of the reported events was the failure to learn from earlier and minor events, i.e. the failure to identify and correct the underlying deficiencies. In a recent analysis of technical and managerial factors in the NASA Challenger and Columbia losses, Leveson (2007) demonstrates that after the Challenger event NASA failed to learn its lessons. She states that after events, the contributing technical factors are relatively easy to be identified and in turn, optimized. In contrast, organizational deficiencies that have contributed to the event are less often fixed in the course of an event analysis. Accordingly, technical and engineering solutions are still negated by undetected organizational deficiencies. That is, the exclusive application of these solutions is obviously not sufficient, since it aims at solving a narrow problem, which is often a symptom, rather than addressing the underlying organizational causes. Thus, it becomes evident that when analyzing events, high hazard systems are confronted with organizing problems that they do not always solve.

In this paper, we propose that the efficiency of organizational learning within high hazard systems is at least partially undermined by the *subjective theories of organizing* held by their members. Specifically, we assume these theories to have a strong impact on how social actors in high hazard systems make sense of events and what lessons they learn from them (e.g. Weick, 1993). We draw on subjective theories of organizing that are based

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on an ‘‘engineering” system understanding, which is deeply rooted in the professional culture of high hazard systems. When relying on these theories in order to analyze and to correct failed social performance (e.g. procedural non-compliance of several social actors, ‘‘check the box”-mentality), the analyzer runs the risk of neglecting the motivational concerns of the acting individuals. In other words, subjective theories based on an ‘‘engineering” understanding of ‘‘how a system and its components perform” involve (social-) psychological blind spots when applied to the functioning of social interactions within high hazard systems. However, as the above mentioned recent analyses show, social system failures are of crucial importance for a variety of problems revealed by the analysis of events.

In the following, we briefly portray our perspective on the role of subjective theories in high hazard systems. We focus on the cognitive and motivational processes that are involved in analyzing and learning from events. Examples are provided illustrating blind spots with respect to (1) the interpretation of information related to failed social system performance (the analysis) and (2) the resulting interventions of failure correction (the learning potential). Finally, we draw conclusions with regard to the specific dynamic of social performance in high hazard systems and propose a research agenda that extends to the social dynamics in the analyses of events. Importantly, our approach does *not* address a specific target group within high hazard systems such as those directly or indirectly involved in the analysis of events (e.g. regulatory authorities, middle managers, the authors themselves). Moreover, we exclusively focus on the dynamics of social and organizational systems, and do not address inherent system influences as for example, of technical, financial and regulatory requirements.

2. Subjective theories of organizing

According to Heider (1958) individuals try to understand their world in the same way that scientists do. They rely on ‘‘their” theories to create a stable meaning system. These theories have been termed intuitive, lay, naïve or subjective (e.g., Hong et al., 2001). People use these theories in everyday life to generate hypothesis and constantly test their utility. Lickel et al. (2001) define intuitive theories as a system of interconnected beliefs that people hold about particular domains of experience. For instance, past research has revealed the influence of intuitive theories on self-perception (Ross, 1977), social judgments (Fletcher and Thomas, 1996), and the interpretation of physical events (Carey and Spelke, 1994). Heath and Staudenmayer (2000) assume that individuals also have intuitive theories about organizing, which may lead to dysfunctional outcomes of their organizational activities. In order to analyze the impact of subjective theories, they distinguish two fundamental problems that have to be solved in the process of organizing: (1) to align the goals of organizational members and (2) to align the actions of organizational members. Based on this differentiation, the authors highlight the notion of ‘‘coordination neglect” by showing that subjective theories of organizing often fail when people try to align others’ actions in order to coordinate work in organizations.

In the present paper, we focus on the cognitive difficulties of interpreting and correcting failed performance of human actors contributing to the emergence of events. In line with Heath and Staudenmayer (2000), we assume that individuals have subjective theories of both the organized performance of social actors as well as the process of organizing, and that these theories are sometimes inadequate with respect to the optimization of social–technical system performance. However, contrary to their approach, we focus on subjective theories emerging in a specific performance setting, i.e. in high hazard, low risk systems. In these systems efficient and safe work performance is meant to be organized by procedures and regulations which standardize work task coordination and communication patterns to the highest levels. In contrast to other types of organizations the ‘‘formal” alignment of actions via organization handbooks, process descriptions and IT systems is fundamentally established. These systems have concrete and visible guide-lines about organized social performance, i.e. how work task coordination within social systems should look. Thus, when events are analyzed in high hazard systems, the performance of social actors is contrasted against these documents and its inherent understanding of social system performance as a clear-cut frame of reference. In the following, we describe facets of such a frame in terms of a subjective theory. We understand these theories as ‘‘theories-in-use” (Argyris, 1982) upon which social actors in high hazard systems continuously act. We formulate fundamental beliefs of an engineering understanding of system performance, which are supposed to underlie learning processes in these systems. We assume that these beliefs guide organization members’ sensemaking when events are analyzed and corrective actions are planned.

3. Fundamental beliefs of subjective theories based on an engineering understanding

One common finding in research on high hazard systems is that systems are characterized by a culture of professionalism striving for perfection (e.g. Helmreich and Merrit, 1998). These systems are designed and operated by highly qualified specialists primarily concerned with the performance of the technical system. A study conducted by Rochlin and von Meier (1994) in several US and European NPPs provides first evidence for the existence of specific cognitive representations and problem-solving styles of social actors in high hazard systems. According to their analysis, work task management in NPPs is fundamentally characterized by the interaction between the ‘‘operator” and the ‘‘engineering” subculture. Members of both cultures differ according to their understanding of how the system performs. The operators understand the plant as an organism with performatively linked components. They think of single components in terms of their physical appearance, sounds, feelings, and actual location in the plant. Consequently, the emerging performance of components is assumed to deviate subtly from performance predictions based on idealized components (p. 169). In contrast, the engineer’s cognitive representations of system performance are characterized as static and deterministic:

> Our archetypal ‘‘engineer” conceptualizes the plant in abstract and formal representation, as a chart where symbols represent idealized components. The plant is understood as the sum of its individual components, connected by specific and discrete linkages; its behavior is predictable according to formal rules governing the behavior of each component (i.e. if all the rules and boundary conditions were known, the state of the physical system at any future time could be predicted unambiguously). The parameters describing components and their interactions are thought of as essentially time-invariant, and invariant with respect to events and conditions not explicitly linked to these parameters (Rochlin and von Meier, 1994, p.168).

Rochlin and von Meier (1994) highlight the collaborative elements of the interaction between the ‘‘engineering” and ‘‘operator” subculture. They argue that the ‘‘clash” between both subcultures produces representational ambiguity which is assumed to be a key mechanism for the functional adaptation to successful operation in these systems. A study by Carroll (1995) illustrates potential cognitive shortcomings which emerge when the engineering