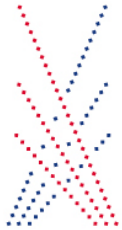

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The Dynamics of Safety Risk Perception in High Reliability Organizations

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Abstract:

Research on risk perception has largely emphasized the process of its social construction, neglecting the interaction between risk perception and the way risk is actually managed. We attempt to address this gap by using the distinction between regulated and managed safety to explore the dynamics of actors' safety risk perception across the different temporalities. We conducted a qualitative case study at a major European nuclear power plant. Preliminary results follow three main temporalities of risk perception across the different sources of reliability and safety risk discourse – international organizations, management and field operators – each reflecting a different perception of risk. We also show how risk perception evolves through a constant confrontation between the discourse about managing risk and the implementation of day-to-day reliability seeking practices. We show how reliability seeking practices that aim to minimize human-related sources of risk end up reinforcing regulated safety at the expense of managed safety. Consequently, instead of preparing actors to face complexity and learn to deal with unexpected events, these reliability seeking practices reinforce mechanistic behavior.

Introduction

Dramatic catastrophes such as the recent crashes of Boeining 737 give rise to a renewed discussion about safety in high-risk organizations (HROs). Whiles waiting for official reports, the experts presume the part of the responsibility on the software adjusting automatically in real time the craft position in the case of anomaly. The faulty data erroneously indicating that the plane was flying at a dangerous angle push the plane's nose down despite the pilots efforts to maintain it (Glanz, Creswell, Kaplan, & Wichter, 2019). This conclusion poses a question of the scope of interventional autonomy given to professionals in high-risk organizations.

Risk accompanies technical and economic progress and to a certain extent is an integral part of life of every organization (Beck, 1992; Power, 2007). Reliability and safety of socio-technical systems has become central for management scholars (Hällgren, Rouleau, & de Rond, 2017). Risk is particularly inherent in everyday activities of high reliability organizations such as, for example, nuclear power plants. Even if risk has always been on the research agenda, after tragic accidents of the recent decades (e.g. Chernobyl in 1986 or Fukusima-Daiichi in 2011), the reliability and safety of socio-technical systems has become central for organization scholars and many national and international professional associations.

Traditionally defined as a probability of occurrence and consequences of some adverse event, risk is increasingly seen as a complex and multi-level phenomenon (Gephart et al., 2009; Miller, 2009; Maguire and Hardy, 2013). Notwithstanding this recognition, risk management literature and practices remain principally based on the probabilistic view of risk, leading to the reinforcement of rigid technical and regulatory barriers to cover the risk (Scheytt, Soin, Sahlin-Andersson, & Power, 2006). Multiple researches shed light on the social construction of risk (e.g. Beck, 1992; Renn, 2008; Scheytt, Soin, Sahlin-Andersson, & Power, 2006; Sjoberg, 2000; Slovic, n.d.; Zinn, 2008). This paper builds on constructivist approach. As a consequence, the research/practice gap deepens as organizational theory remains "limited in its ability to explain how organizations do and should deal with risk" (Hardy and Maguire, 2016, p.4).

Risk can be managed if its potential sources and impact can be accurately assessed. Literature acknowledges the importance to integrate three distinct phases of dealing with risk: before, during and after (Hardy & Maguire, 2016). Before relates to organizational processes stopping failures from happening (mindful processes, Weick et al., 1999). It is the collective constructing of understanding of what risk is and where it can come from. After relates to organizational responses to environmental jolts (time that the organization needed to restore normal levels of operations) (Meyer, 1982). In this paper we are interested to building risk perception and building competences to respond to unforeseen events across these three temporalities. The objective of this paper is to understand how the process of risk perception interacts with the process of dealing with risk.

We conducted a qualitative case study at a major European power plant (we name Alpha for confidentiality reasons) that was in the process of introducing new safety seeking measures. Since organizations operate in a "discursive space" of multiple external and internal stakeholders (Tsoukas, 1999, p. 499), we turned our attention to what the different stakeholders actually say about risk at Alpha. More specifically, our aim was to explore the construction and the evolution of the perception of risk across discourses and its impact on the way to deal with risk.

The paper is structured as follows. First, we review the literature on risk perception and on organizing to deal with risk. Second, we present our qualitative case study methodology. Third, we briefly describe main findings about the evolution of the perception of risk. Finally, we discuss the contributions and limitations of our research.

Literature review

1. Perception of Risk: social construction and power relations

Classical technical vision of risk is based on accurate and objective risk assessment. It presumes that all risk may be evaluated, predicted and managed by minimizing its occurrence or impact (Fox, 1999, p. 13) This probabilistic risk assessment allowed the detections of failures and valuable improvement of safety performance (Renn, 2008, p. 14). However, researched shows that it is difficult to model failure and to predict complex human-machine interactions. Critics of this point of view help to develop the approach of socially constructed and historically specific character of risk conceptualization (Fox, 1999, p. 13).

Literature (Douglas, 1996; Miller, 2009) suggests that beyond individual psychology (Slovic et al., 1981), social forms and culture influence the construction of the understanding of risk. In complex, socially constructed systems, risk is subjective and unquantifiable. This view offers the distinction between hazard, as a natural circumstance, and risk, as a cultural judgment concerning this event. It refers to the creation of meaning of the experience of harm and hazard by a social and cultural groups. The hazardous eventualities of adverse outcomes appear in the discourse and are used to guide and justify risk management work (policies, regulation and communication). Risk perception not only puts value on an event, but it can also produce new hazards (Fox, 1999; Renn, 2008). Therefore, the existence of risk depends on the knowledge about it, which in turn may produce unintended and often unforeseeable negative side effects of collective decisions (Renn, 2008: xiv; Sheytt et al., 2016). Therefore, « *access to and control of knowledge thus became paramount in a risk society* » (Fox, 1999, p. 13). This Foucauldian postmodernist approach underlines the ability to transform initially "neutral" object into a "hazardous" one through risk discourse. The latter is defined as "collections of interrelated texts and practices" (Maguire & Hardy, 2013). Since societal power relations are reflected in the discourses (Zinn, 2008, p. 14), the reference group's judgment is important since it influences what is considered risky and what is not. These beliefs, determined by structural forces, build up to risk perception (Douglas & Wildavsky, 1982). Over time, actors select and rearrange signals to build risk meaning (Renn, 2008, p. 2) to guide an ongoing risk perception construction.

Risk perception results from the interaction of group reasoning, personal experience, social communication and cultural traditions (e.g. Pidgeon, 1991; Renn, 2008). There is a growing consensus that more research is required about the dynamic processes of risk perception and responses (Power, 2016; Zinn, 2008). Hardy and Maguire (2016) underline the existence of three streams of risk research focusing on: 1) the future, 2) the real time or 3) the past experience of the risk. The prospective view (1) acknowledges the unpredictable and deals with organizing to prevent risk. The real-time view (2) focuses on the implementation of predetermined procedures to control and to contain harms and damages. Finally, retrospective view (3) points on the way to improve and to organize risk in the future. Hardy and Maguire (2016) insist that only a combination of these three temporalities offers a complete view of how organizations deal with risk. This avenue for future research calls for empirical work taking into account three modes and their interrelations.

Besides being temporally contingent, risk perception that is part of social processes and discourses, is also spatially determined. However, it is not clear today how each collective actor in the same industry contributes to a collective risk perception and how this negotiated and renegotiated risk perception influences the ability to manage risk (Maguire & Hardy, 2013).

2. Dealing with Risk : Controlling/sensing and managed/regulated safety

Risk perception, linked to organizational attention (Scheytt et al., 2006) and mediated through discourse, is socially constructed. Discourse defining norms of acceptance of risk is constructed by

social ordering (Maguire & Hardy, 2013) and includes texts and practices (Hardy & Maguire, 2016).

Maguire and Hardy (2013) show how an object becomes risky as a result of the practices. In particular, they pay attention to social ordering – as a set of practices regrouped in patterns and structure. Social ordering is a set of interrelated practices that frame discourse to stabilize, destabilize and change the meaning. It is persistent over time. Maguire and Hardy (2013) highlight the relevance of social ordering for understanding real time (2) dealing with risk. The authors believe that social ordering is essential for high-risk organizations facing immediate risk in daily activities. They highlight the predominance of systematic, top-down controlling through measuring, monitoring and authorizing through successive levels of hierarchy. They also highlight the importance of a particular social ordering: sensing. Sensing refers to intuiting, using tacit knowledge, and processing of weak signals (Weick & Sutcliffe, 2006). Weick (1993) views the reality as an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs. The idea is to be able to construct meaning from a panel of relevant signals relative to the object in question and its immediate context and then to imagine appropriate, more or less innovative, responses (i.e. outside established procedures).

Safety science revisits this HROs literature and echoes controlling/sensing social ordering by making a distinction between regulated and managed safety. While regulated safety refers to the organization's technical systems and procedures, allowing it to deal with predictable events, managed safety corresponds to organization's capacity to proactively deal with unexpected events. Managed safety is defined by the Institute for Industrial Safety Culture (IISC) as a form of safety "based on the competence of women and men, capable to identify the situation "*in the here and now*" and to develop appropriate responses (Besnard, Boissières, Daniellou, & Villena, 2017, p. 21). Even is research has explored the construction of risk perception though organizing processes, it is still unclear how practices bundle into different forms of social ordering and how organizations deal with risk according the perception of risk by the local actors.

The way to deal with risk depends on the beliefs about possible causes of uncertain harms. Renn (2008) underlines the divergent views about the tolerability of uncertainty. Following Grote's (2007) framework, organizations have two possible paths to perceive risk and to respond to it: 1) to diminish uncertainties by reducing freedom and standardizing technology; 2) to manage uncertainties by maximizing freedom and enhancing competencies to deal with complex tasks. The first path of response to uncertainty involves evaluating and controlling risk by applying extensive regulated safety tools (Hardy & Maguire, 2016). It refers to the traditional expert-based view of risk (Scheytt et al., 2006). This view is highly criticized because it is impossible to assess risk with precision (e.g. Maguire & Hardy, 2013; Pidgeon, 1991; Tsoukas, 1999). Rules and procedures have their limits (Bourrier & Bieder, 2013; Smith & Tombs, 1995) and extensive risk management activities may paradoxically create additional uncertainties (Scheytt et al., 2006) and disruptions (Leveson, Dulac, Marais, & Carroll, 2009). While the source of uncertainty is considered in the lack of data, ambiguity and ignorance (Maguire & Hardy, 2013, p. 249), the organizations tend to develop have to access to greater data and to develop more sophisticated modeling.

Notwithstanding considerable technological and regulatory efforts to control risk, uncertainty will never disappear. Consequently, managers in HROs need to find ways to account for uncertainty by enabling both regulated and managed safety. Therefore, uncertainty should not only be dealt with via technological compliance, but also through the development of practices that guide managerial attention, resources and allocation of responsibilities (Grote, 2007; Scheytt et al., 2006). Turning back to safety literature, to ensure safety in these complex, high-risk environments, managed and regulated safety must mutually reinforce each another. However, scholars highlight

that the development of regulated safety jeopardizes managed safety (Bourrier & Bieder, 2013; Oliver, Calvard, & Potocnik, 2017) by constraining the development of collective mindfulness. In other world, the reinforced path to diminish risk may interfere with the capacity to face unpredictable events. This literature does not take into account how the meaning of risk is build.

The social nature of risk perception calls of an examination of the processes of its construction. In line with organizational becoming perspective (Tsoukas & Chia, 2002) scholars acknowledge a dynamic nature of risk perception construction (Miller, 2009) through interrelated practices, texts and relations that make risk constructed and "known" (Hardy & Maguire, 2016). This article aims to explore how the process of risk perception construction interacts with the process of dealing with risk?

Methodology

The novelty of the field and the nature of our research question in terms of "how?" influenced our choice of that qualitative, discursive approach (Maguire & Hardy, 2013) that offers the insights on actors' interpretations and organizational sense making around risk (Gephart, 1993).

We collected data through a case study of a European nuclear power plant, Alpha. This organization operates in a complex, high-risk, dynamic environment. The high impact of potential accidents makes this industry strongly regulated and controlled. Moreover, the eco-system of relations in this industry is extremely complex. It is made up of a diversity of stakeholders with often-contradictory interests and objectives: operating teams, firms, experts, politicians as well as national and international regulatory bodies (i.e. International Atomic Energy Agency; Institute of Nuclear Power Operations stablished following the investigation of the Three Mile Island accident; Institute for Industrial Safety Culture created after the explosion at the AZF factory in Toulouse in 2001 or World Association of Nuclear Operators). These organizations set industry-wide performance objectives, evaluation criteria, and guidelines to promote operational excellence.
We generated data via non-participant observation and 23 semi-structured interviews (7 collective and 16 individual :these interviews have been conducted during a collective study, in which the author takes part). We observed organizational managerial practices (meetings, audio-conferences, briefings, and training seminars) and asked interviewees about their perceptions, reactions and the preoccupations with organizational safety discourse and reliability practices. In addition, we collected a rich retrospective data from internal nuclear operator documents about reliability practices and texts of international organisms' recommendation. We enriched our qualitative results with the results obtained from 404 quantitative exploratory questionnaires, focusing on the perceptions of risk and of the practical aspects of implementation of reliability principles.

In data analysis, we triangulated between primary and secondary, as well as qualitative and quantitate data. We started by identifying data sources relative to the implementation of reliability practices and the perception of risk. We ordered the data sources and notes chronologically. We systematically coded the data focusing on the sense-making by managers and the social construction of the meaning of risk (Gephart, 2013). We constantly iterated between triangulated data and the literature.

Preliminary Results

In this section, three vignettes help us to identify three main "spaces" of discourse about reliability and safety risk (international organisms, management and field operators) and to demonstrate the process of dealing with risk across three temporalities. Finally, we show how the perception of risk evolves through a constant confrontation between the discourse about managing

risk and the implementation of day-to-day reliability practices. In particular, we shed light on some vicious circles that enclose rather than enrich the perception of risk.

1. *Different perceptions at different spaces of discourse: focus on prospective view*

Empirical data clearly shows the differences of risk perceptions by the different collective actors in the nuclear industry: international organisms, top-level managers and field actors. The first vignette illustrates the spaces of discourse formed by actors directly engaged on the construction of the risk perception in a nuclear sector.

To increase safety and reliability international organisms offer a meta-discourse on risk that recognizes the necessity to face unpredictable events. Created after the Chernobyl accident, the World Association of Nuclear Operators (WANO) plays an important role in the nuclear industry. Via peer-reviews and audits, it collects and shares the best international nuclear operators' practices with a particular attention on safety issues. WANO distinctly insists on the importance of the safety culture and recognizes the questioning attitude as one of the traits of healthy nuclear safety culture: "*Individuals understand that complex technologies can fail in unpredictable ways"; "Challenge the Unknown: Individuals stop when faced with uncertain conditions."* (WANO, 2013, p. 6). As such, they acknowledge the existence of an unavoidable uncertainty that characterizes the nuclear sector. In addition, despite the evidence of the importance of rules and procedures, WANO recommendations invite to "*continuously challenge existing conditions, assumptions, anomalies and activities to identify discrepancies that might result in errors or inappropriate actions*" and "*recognize and plan for the possibility of mistakes, latent issues and inherent risk, even while expecting successful outcomes"* (WANO, 2013, p. 7). According to WANO, these principles should be implemented in practice within nuclear power plants. Due to its highly hierarchical structure, the diffusion of the recommendations and the prescriptions has a pronounced top-down path.

Even if since 2013 WANO highlights the existence of uncertainty of the nuclear industry, operator's top-level managers continue to insist on the necessity to establish practices covering all possible risks, to "*reduce the gap between the planned and the real experience*" (Alpha documentation, Human Performance). The practice should be "*well thought out and well done*" (Interview, top operational manager). Moreover, in the management discourse, an operator who performs a risky activity is the main uncovered source of uncertainty and of potential risk: "*in every accident or non-quality it is often possible to find one or few human errors allowing to explain the occurrence of the adverse event*" (Alpha documentation, Human Performance). Consequently, the "*reliability of operational practices is resolutely focused on the operators*" (Alpha documentation, Human Performance) and especially its skills to follow predetermined procedures and rules. Some operational practices should be performed in « *reflex mode* », without any deviation from the existing procedures.This layer of managerial discourse seems to be in tension with the discourse of the middle managers. Despite some voiced critiques about imposed decisions, operational managers implement top-level decisions in every day practices.

Interestingly, the discourse of field actors reveals some degree of resistance to top-down managerial reliability discourse. They acknowledge the inherent uncertainty of the nuclear activity: "*we can't image from where risks come*" (Individual interview,

operational manager). To cope with this uncertainty, the field actors reject lack of flexibility of procedures. The responses to the survey question: "*Risk could not be totally manageable because certain safety risk is impossible to predict*?" (Internal documentation, Questionnaire results) clearly reflect the differences in risk perception between the top-management (100% of top-management do not agree with this statement) and the field operators (only 53% do not agree).

The perception of risk refers on the underlying idea about the source of uncertainty capable to result in adverse events. Some social ordering tendencies emerge at the different discourse spaces. International associations level highlights the importance of both rigorous respect of prescribed procedures and sensing through a questioning attitude and systemic decision-making. Alpha top level management clearly stresses controlling practices, with a special focus on human activities as a main source of possible adverse events. Even if the middle managers, especially in lower levels, tend to criticize this approach in the interviews, they comply to the top-down rules. The operators on the other hand, demonstrate the need for sensing and questioning, probably because they are the ones who are involved in dealing with dangerous situations. A safety engineer acknowledges: *"What works well is the motivation and engagement of agents in their work, especially in a case of fortuitous events. They really make an effort ».* (Interview, Safety engineer).

2. *The evolution of the risk perception through the implementation of reliability practices: focus on in-situ view*

Operators are continuously facing real-time situations calling to deal with risk in situ. In addition to all existing operational and safety procedures, Alpha introduces some reliability seeking practice in order to secure human intervention actions. Second vignette presents these practices and the way they are operationalized within the organization.

Mangers have a challenge to translate safety recommendations and principles into operational practices. In order to be able to evaluate and compare safety practices, their implementation should be measurable and auditable. Since, according to the managers, operators are the source of risk uncovered by technical barriers and standardizations, Alpha considers that progress of reliability mainly depends on the development of five concrete behavioral-focused Reliability Seeking Practices (RSP). The latter originate in psychology and aim to ensure that human operators "*do right on the first try*" (Internal documentation, "Human Performance"). In our research, we chose to pay closer attention to three concrete practices: 1) pre-job briefing (risk and procedures and declaration to be ready to act), 2) one-minute wait (quick pause to look and check the environment) and 3) self-checking (pronounce aloud the references of installation by pointing the finger on it). These behavioral practices should be done "*systematically in a reflex-mode*" (Internal documentation, Human Performance). For example, cognitive psychology shows that embodied practices are more resistant to perturbations caused by pressure and stress. Based on this knowledge the RSP of self-control prescribes, before the beginning of work, a specific way of reading the procedure: "aloud and by following the text with a finger" (Internal documentation, Field intervention practices). It shows that risk is perceived as non-compliance of human action toward planned procedure.

In addition, the way to implement these practices in the daily activities reflects a top-down approach. Interestingly, the implementation is different for young and experienced agents. *"For young people, they impose reliability seeking practices: they must be learned and implemented from the outset. The experienced ones, we had other natural means, we did them without being accountable. People are much less resistant than before. They have no choice; they have to do what they have to do by going out into the field."* (Interview, middle operational managers) " RSP tend to match real in-time activity to the predefined procedures of action by formalizing the exact gesture of agents. However, the real-life situation may be unexpected or unclear in the existing rules. The field actors acknowledge the necessity to adapt the rules to the real situation. "*It is necessary to have an association of theory and field, knowledge and understanding of how it works. We can have more distance to understand the impact of my activity on the field*" (Interview, middle functional manager).

Alpha's way of controlling risk may be effective in case of predetermined scenarios; however, it loses its power in face of unexpected or unknown situations. Field operators are asked to do exactly what is expected, but they are not prepared to cope with uncertainty, in other words to be mindful. In addition, these practices evolved from being recommendations for action to becoming quantifiably measured and controlled variables (number of pre-job briefing checkboxes crossed, managerial observation of self-control gesture). In this perspective, the aim of control is to make sure the practice exists and not to check if it is efficient.

To sum up, managers' perception of risk depends on what they believe is manageable in safety practices leading to the disappearance of the risk linked to inherent uncertainty of complex systems. Even if the collective actors focused on safety (WANO and IISC) outline the necessity to develop managed safety, in practice operators such as Alpha simply extend regulated safety principles to the management of human resources.

3. Learning role in the construction of the risk perception: focus on retrospective view

The third vignette attracts attention to the organizing of the Return of Experience (REX) and learning. This may be a lever to precise and enrich the risk perception over the time, if the learning process is efficient. Empirical data attract attention to some difficulties in the implementation of the learning based on REX.

WANO highlights the value of learning as the opportunity to continuously learn: "*Operating experience is highly valued and the capacity to learn from experience is well developed".* "*Operating Experience: Relevant internal and external operating experience is systematically and effectively collected, evaluated and lessons learned are implemented in a timely manner by the organization*." (WANO, 2013, p. 7).

The Alpha management acknowledges the importance of learning opportunities: *"we developed a retrospective logic* (Interview, top operational manager). Nevertheless, the top management recognizes the limits of existing the return of the experience organizing. The focus of the REX in Alpha is naturally turned on the collection and the analysis of the rules deviation. Managers are preoccupied on indicators of signaled deviations. Informants are preoccupied about the REX, pointing to lack of the resources and lack of the time, what results in the delay on treatment of signaled gaps

The Alpha's way to managed REX systems confirm the tendencies to rely on measurable controllable indicators. However, the difficulties to codify and to treat the REX slows the valuable exploitation of the learning opportunities. The presented vignettes inform about the risk perception construction and about the ways to deal the risks before, in real time and after their occurrence. These processes are interdependent and influence each other.

4. Integrated view and vicious circles

In this part we explore why and how of the vicious dynamics appears, based on the controlling ordering, the emphasis on the human error and the absence of the consideration of the systemic, unpredictable risks coming from the organization.

Our analysis of spatially and temporally situated risk perception allows us to discover following results. International operators associations, such WANO, influence mainly the construction of the perception of the risk in prospective manner. They do not influence directly in time operation, but serve to collect and to share best practices based on REX. Their recommendations aim to aware operators about important technical and organizational issues to develop in order to be ready to guarantee safety. In our case, the top management chose to promote controlling aspect and ignore in their action the necessity to face unpredictable situations. In real time risk situation, the management reaffirms its expectations to respect planned action. The fields actors obviously follow the procedures, but recognize that prescribed rules or actions may be inconsistent with real situation and possible unforeseen event. In this case, they lean on their expertise and their competence to adapt as a part of professionalism development. Effective learning may reinforce this ability. Alpha's informants recognize that thier REX practices are insufficient and are not systematically integrated in the flow of operational activities during in time action neither before it.

This illustrate a salient need to develop field actions competences to deal with unpredictable and to enrich the perception of risk by integrating the inherent complex system uncertainty, rather than reinforce partial view of risk coming from human non-compliance actions. Nevertheless, existing Alpha's discourse and practices are implied in some vicious circles. These circles enlighten the relations between interdependent processes of the construction of risk perception and of the dealing with risk.

First vicious circle:

The technical system becomes more sophisticated and includes a growing number of automatic controls. The underlying assumption that the human behavior is the only source of non-covered risk. It guides the organization to reinforce controlling practice and to improve regulated safety. For example, reliability-seeking practices are designed to diminish the uncertainty sourcing from human agency and non-compliance activities. In this way, Alpha skips a necessary development of sensing practices in order to enhance the competence of field actors to face broader uncertainly and unpredictable situations. This managed safety is recommended by WANO: "*Operators are vested with the authority and understand the expectation, when faced with unexpected or uncertain conditions, to place the plant in a safe condition*." (WANO, 2013, p. 8). However, the more Alpha reinforces the control, the more it is difficult to maintain and develop systematic and complete view of the situation.

This refers to second vicious circle:

By strengthening regulated safety, Alpha's management tends to control the field operators' behavior. Controlling leads to "mechanistic" practices by imposing particular gestures or step-by-step procedure-like practices. Nerveless, managed safety practices and sensing depend on the competences to deal with real situations. The danger to automatize and to simplify human

intervention results in the professionalism of the actors. First, the simplified tasks favor a simplified representation of the working context that limits the operators' ability to understand a complex system and to recognize and to interpret non-anticipated weak signals. Second, the more some tasks can be performed by simple application of rules in the reflex-mode, the more these tasks are considered simple and routine and the more there is a risk of mind wandering (Smallwood & Schooler, 2013). The reflex-mode may reduce the capacity to develop the operators' mindfulness and adaptability deal with unpredictable events. Therefore, the lack of professionalism reinforced by mind wandering may result in mistrust of field operators. WANO underlines trust as an important trait of healthy safety culture and recommend to "*encouraged to voice concerns, provide suggestions and raise questions. Differing opinions are also encouraged and respected*." (WANO, 2013, p. 9). However, the operators need to legitimate their expertise and professionalism in order to be heard and to become a part of decision-making.

Conclusion and Discussion

In this paper, we studied the interaction between the process of risk construction the way of dealing with risk. Identified vicious circles illustrate these relations. In Alpha's case, the implementation of RSP narrow the perception of risk and reinforce the regulated safety tendencies in contradiction with managed safety development recommendations.

We contribute to risk perception literature by studying how: 1) risk perception differs across different levels and temporalities and 2) meanings are constructed at the intersection of practices and discourses. We respond to the request of Hardy and Maguire (2016) to develop our understanding of risk perception dynamics ways of organizing and risk discourses.

We explore the relation between underlying belief about source of uncertainty and the way of organizing about risks. The human agency as the main cause of adverse event engages enclosing practices leading to the loss of professionalism and to the growing mistrust on operators. We show how RSP practices focus on compliance to reflex-mode actions, instead of effort to develop mindfulness and prepare fields operators to face unknown. This paper highlights that even if the risk perception and affiliated reliability practices are turned to individual uncertainty, they remain part of the regulated safety.

Desire to control to the detriment of sensing may result in the weakening of organizational capacity to confront unforeseen events in real-life situations. Our results are in line with Grote (2007): the case study of Alpha shows how management tried to diminish risk by implementing auditable operational practices (RSPs) instead of developing capabilities to cope with uncertainty. RSP in Alpha's implementation refer to dominant discourse of organizing risk based on procedures and predetermined plans (Maguire & Hardy, 2013), what leads a poorer representation of risk (Hardy & Maguire, 2016) and side effects (Scheytt et al., 2006).

If organization choses to follow only control-based ways to diminish risk, the perceived inherent uncertainty (ambiguity and ignorance) will be considered as covered thanks to data gathering and advanced modeling. This approach adds confidence to technical systems and further decline the trust on human as unique non covered (despite attempts from cognitive psychology) source of uncertainty and therefore risk. This dominant discourse of risk has limited effectiveness in a case of unfamiliar, unexpectedly emerged risk.

This managerial contribution guides organizations in their way to perceive and deal with risk. Instead of reinforcing regulated safety based on technology and procedures, organizations need to reinforce both regulated (sophisticated technical systems and procedures) **and** managed safety (professionalism, competence, learning, etc.).

One major limitation of this research is that our results cannot (yet) be generalized, for two primary reasons. First, our study was conducted in a single organization (Alpha) in the nuclear energy industry. Data collection would have benefited from being conducted in multiple organizations of different sizes and from different industries. Second, our investigation could have gone further in studying the causal mechanisms responsible for the evolution of risk perception.

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