Chapter 11
Responsive Regulation, Trust, and Intrinsic Motivation Within the Nuclear Industry: Impacts of a Safety Culture Tool

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Abstract Safety culture has now a long history within the nuclear industry. Since the first appearance of the concept in the aftermath of the Chernobyl accident, growing attention has been paid to cultural issues with regard to safety. The concept is also highly contested and several authors suggested that regulatory bodies (RB) should stay away from safety culture. In contrast, this chapter intends to explore the impacts of a safety culture tool on the regulator–regulatee relationship, in particular, regarding a more responsive regulatory approach, the interactions between trust and control, and the motivation of licensees to be compliant.

Keywords Safety culture assessment · Safety oversight · Responsive regulation

Safety culture is nowadays a fashionable concept. In contrast, an important and influential part of research in that field has shown some reluctance to use this concept. Among the critics, it is pointed out that safety culture discards deeper organisational analyses taking into account interactions between culture, technology, and structure (Naevestad 2009), power relations (Antonsen 2009), or actual meanings behind observable behaviours (Silbey 2009; Guldenmund, 2010). Hopkins (2018) adopts an even more radical approach since he considered that the concept should be abandoned.

Therefore, some authors recommend to regulatory bodies (RB) to stay away from safety culture (Grote and Weichbrodt 2013). In that line of thinking, safety culture seems indeed weakly appropriate for regulating at-risk industry: safety culture is apparently highly abstract and intangible, it cannot be imposed through prescriptive rules, and safety culture is hardly measurable through numbers and also difficult to address at a distance.

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However, safety culture is also about reorganising routines and promoting a shift in perspective in the regulatory work. As a complement to a traditional compliance-based or a goal-oriented oversight strategy, safety culture lays the emphasis on a more responsive attitude, i.e., a regulatory style responding to the safety frames of reference (mindset) of a regulated entity and evolving according to the progresses implemented.

The safety culture assessment tool considered in this chapter is mainly based on field observations. Applied for several years within Bel V (the Belgian nuclear TSO), the assessment process is fed by safety culture observations performed by inspectors after any contact with a licensee. These observations are recorded within an observation sheet and are assessed on a yearly and multiannual basis. The main results of the assessment are shared and discussed with the concerned licensee.

Focusing on the regulator–regulatee relationship, the chapter will explore the way in which this safety culture tool has an impact on trust between a regulator and a nuclear licensee. In addition, we will show that the nature of the results of safety culture assessment—strongly based on metaphorical expressions—has an impact on the type of licensee motivation to follow the requirements. At the core of the relationship between the regulator and the regulatee, the results of the safety culture assessment aim indeed at stimulating self-regulation and encouraging a regulated entity to a proactive reflection about its performance.

11.1 Safety Culture as a Responsive Regulation Tool

As developed in a previous paper (Bernard 2014), safety culture oversight calls for a shift in perspective for regulatory bodies. Driven by a holistic and systemic approach, safety culture oversight allows a regulatory body to develop a more responsive attitude (Ayres and Braithwaite 1992; Baldwin and Black 2008).

Within compliance-based regulation—grounded in an analytic perspective—the focus is given on the licensee's rule compliance, and, consequently, on potential discrepancies. Within a goal or performance-based orientation, the regulator compares the performance of the licensees regarding pre-defined criteria.

The traditional compliance-based regulatory strategy allows a formalism that helps to foster greater compliance. Nevertheless, this prescriptive approach implies a "by-the-book" enforcement style that could induce "adversarial legalism" on the part of licensees (see Table 11.1). Moreover, rigid enforcement is not always optimal to develop a cooperative climate between inspectors and a licensee (May and Wood 2003) or to promote the continuous improvement of a plant.

Rather than seeking adherence to requirements, performance-based regulation embodies the notion that regulation should be based on specific outcomes to achieve. This regulatory model is grounded in a reactive strategy. As a core disadvantage, this approach tends to focus on well-known risks or familiar issues that could give rise to narrow safety assessments by the regulator.

Table 11.1 Summary of the distinctions between compliance-based, goal-oriented, and responsive regulatory strategies

	Compliance-based	Goal-oriented	Responsive
Relation to regulatees	Prescriptive	Reactive	Adaptive
Methodological approach	Analytic	Performative or probabilistic	Holistic and systemic
RB expectations	Adherence	Achievement	Mindfulness and improvement
Oversight focus	Level of rule compliance and discrepancies	Methods and outputs monitoring	Frames of reference mindset

Conversely, safety culture enables a holistic and a systemic view of safety. As we will see in the next sections of this paper, safety culture cannot be directly regulated, but it can be observed in order to develop a cross-cutting perspective of an at-risk installation and to engage a licensee in the continuous improvement of its behavioural and organisational capabilities. In addition, extending the field of intervention of a regulatory body and its understanding of a licensee frame of reference, safety culture observations contribute to more flexible oversight.

11.2 A Combination of Trust and Control

According to responsive regulation theory, cooperation and trust are at the heart of the regulator–regulatee relationship. This trust issue is even more important when sensitive aspects such as safety culture observations are discussed with licensees (Naevestad et al. 2019).

Regarding the experience gained through the implementation of the tool, it appears that trust and control are more complements than substitutes (Six 2013): trust and control are indeed parallel concepts and should be understood in their interactions and combination. Following this line of thought, we posit that more trust doesn't mean less control.

Actually, from a regulatory body approach, a safety culture oversight process is an opportunity to capture informal safety issues that are sometimes poorly addressed (e.g., leadership style, capacity to change, workforce perceptions …). In other words, a safety culture assessment provides a regulatory body with a better view of the strengths and weaknesses of a nuclear installation as well as of the safety areas in need of attention.

The assessment method used has been already introduced in previous works (Bernard 2018). In a nutshell, safety culture observations are analysed through a four-dimensional model structured by two axes. Firstly, safety culture observations could concern "organisational processes" or "behavioural" issues. Secondly, safety

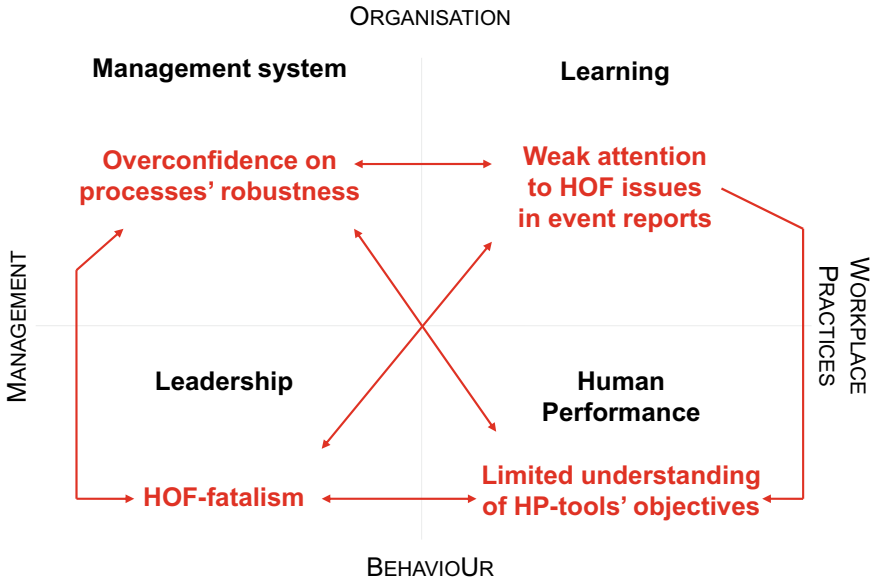

Fig. 11.1 Illustration of the types of safety culture observations that were made following the assessment of a nuclear facility

culture observations could concern "managerial" issues (what is said and done by managers) or "workplace practices" (what is done in the field). At the intersection of the two axes, four zones appear reflecting the different "building blocks" of safety culture: i.e., management system, leadership, human performance (HP), and learning. Figure 11.1 illustrates the overall results from the assessment of a nuclear installation.

These results identified specific issues but showed also the strong interactions between the four safety culture dimensions: the overall overconfidence regarding the robustness of processes leads people to play down "what is really done" in the field and minimise the importance of human performance (HP) issues. More largely, HOF-related problems are therefore not sufficiently considered and a "HOF-fatalism" appears (for instance, assertions such as "what can we do to resolve or manage HOF issues" are regularly captured within this plant). This in turn reinforces the importance attached to processual and technical sides of safety as well as the shared belief that the organisation in place "cannot go wrong".

From a regulatory perspective, it was then of high importance to monitor the capacity of the plant to adopt a less overconfident self-view. The learning dimension and, in particular, the quality of event root causes analysis were of high importance to enhance an open-minded view on actual field practices in order to avoid excessive confidence in past results. In a responsive way, a RB could then follow up progress regarding root causes analysis methods, including HOF issues, and, more specifically, to monitor the potential impacts on the HOF maturity level within the plant.

In other words, through this kind of tool, a regulatory body obtains valuable insight into the critical safety issues to be addressed by a licensee and, therefore, to verify its capability to provide appropriate actions to tackle these issues.

As a result, the safety culture tool increases the level of trust concerning some safety areas but, at the same time, extends the scope of RB control: the use of the tool creates a broader knowledge of the status of the plant (intangible aspects) and challenges the existing "boundaries" between trust and distrust.

11.3 Metaphors as Keys to Cognitive Changes

Adopting a regulatory perspective, we saw that a safety culture assessment provides a larger and deeper understanding of the frames of reference within a regulated installation. Indeed, as a main added value, a safety culture assessment allows a regulator to better understand the mental frameworks, norm sets and value-laden explaining attitudes, behaviours, and organisational practices. As already mentioned, this information is critical to the ability to request and monitor changes within a regulated installation.

We intend also to highlight the role of "metaphors" as critical elements of the building of regulator–regulatee relationships. Metaphors such as stories or myths play a key role in constructing, maintaining and improving a culture. Regarding safety, these metaphors—such as those described in the literature, e.g., "Practical drift" (Snook 2000), the "Normalization of deviance" (Vaughan 1996), the "Icarus Paradox" (Miller 1992) or, in our case, "HOF-fatalism"—are all the more important since they are shared and used to figure out shortcomings and then nurture safety imagination.

As a case in point, in the frame of an inspection with the head of the safety department of the assessed plant, we had the opportunity to capture the following (safety culture) observation:

> During an inspection, several weeks after the yearly safety report highlighting the overall results of the safety culture assessment, the head of the safety department explained to the inspector (the author of the assessment but who was not present during the presentation of results to the director board of the plant) that "HOF-fatalism" was a critical issue for them. He gave an extensive explanation of the metaphor and realized after several minutes that the inspector could have been the author of the safety culture assessment (and asked). (Extract from working notes made by this author)

Firstly, this observation certainly reflects the licensee's willingness to take into consideration the regulator's view. However, in our view, the candid and spontaneous explanation by the licensee was not purely driven by an objective of pleasing the regulator. From our perspective, beyond the anecdote, there is evidence that the safety director gave an implicit message to the regulator, a "relational signal" (Lindenberg 2000) expressing the regulatee commitment to the regulator's view.

Using an image to convey meanings about safety, the metaphor appears then to be an effective communication tool between the regulator and the regulatee. More fundamentally, we argue that the metaphor played a critical role in changing the cognitive framework of the licensee. Obviously, it was only the position of one of the plant directors, who holds a special interest in maintaining the quality of the relationship with the regulator. But as a matter of fact, HOF issues as well as the maturity level of the plant in this area were far from being a priority before the dissemination of the results.

In other words, the results of the assessment contributed to stimulating more proactive reflection about the plant safety performance. From a problem considered as "intractable", HOF turned out to be a safety issue to be further addressed. Highlighting the "HOF-fatalism", the regulators expressed a concern on an area in need of improvement. Adopting the metaphor, the regulatee raised its awareness and recognised the safety issue.

In addition, in contrast with technical facts or discrepancies against safety standards, the licensee perceived regulatory action as not purely controlling but promoting or improving safety: the kind of results obtained from the safety culture assessment induces the licensee self-regulation. As a result, the accountability requested from the regulatee is no longer driven by bureaucratic compliance but grounded in higher awareness and stronger ownership. Put another way, this enables "self-determination" (Deci and Ryan 2000) which has a positive effect on intrinsic (vs. externally dictated) motivation to be "compliant".

11.4 Conclusions

This chapter explored the impact of a safety culture tool on regulator–regulatee relationships. We stressed that safety culture allows more adaptive safety oversight and, at the micro-level, challenges the existing balance between trust and control. In addition, we highlighted the pivotal role of "metaphors", as concepts used outside of their conventional frame—Reason's "Swiss Cheese Model" is certainly one of the most striking examples in this respect.

Focusing on the experience gained from the implementation of a safety culture observation tool, metaphors have been considered as a valuable means by which the regulator, and the regulatee can find common understanding. Metaphors also play a key role in increasing intrinsic motivation for compliance.

Moreover, bearing in mind that regulation is an attempt to alter the behaviour of the regulated, we also highlighted a change in the licensee's cognitive frame. In other words, regarding the question of measuring the success or failure of a regulatory strategy, we argue that the impact on the regulatee cognitive framework is a relevant indicator.

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