NextGen Safety Leaders: An evidence-based safety leadership program for the explosives industry

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Abstract

Safety is typically positioned as an 'all or nothing' event. Safety first. Safety as a number one priority. Yet, internationally, safety performance statistics have stalled in many industries. With the rapid evolution of modern workplaces – pandemics, technological innovation, market disruption – our approach to safety must also evolve and increase in complexity. This paper describes the development of an evidence-based and contemporary thinking safety leadership program. The program is based on the premise that health and safety must be reimagined, and the inherent tensions and contradictions in modern work embraced to achieve continued improvements in performance. We describe the development of a three-module frontline leadership safety program that incorporates concepts like resilience, psychological safety, trust, and modern ideas about team safety behaviour (deep compliance, safely adapting, safety voice).

Keywords: safety leadership, influence, paradox, safety training transfer.

Introduction

The notion of a volatile, uncertain, complex, and ambiguous (VUCA) world has become so widespread that it is almost a cliché. Climate change, technological innovation, world-wide health emergencies, and rapidly changing business markets collectively feed into the challenges that organisations face today. As environments become more complex, conditions deteriorate and change, and resources are harder to come by, organisational members, and particularly leaders, will find themselves facing a menagerie of conflicted and contradictory situations (Lewis, 2000).

Nowhere are contradictions and dilemmas more apparent than in the leadership of safety. Indeed, for decades the paradoxical nature of leading safety in the context of organisational pressures, demands and challenges has been well known. Reason (2000) articulated four core 'paradoxes' inherent within safety: (1) that safety tends to be measured more by its absence than by its presence (i.e., nothing 'bad' happens), (2) defences and controls can not only create safety but also create weaknesses, (3) safety activities aim to constrain variability but also promote improvisation, and (4) belief in 'absolute' safety can erode performance; yet, a preoccupation with failure can bolster safety outcomes. Others have described these tensions in terms of fundamentals trade-offs that employees make, such as investment in either efficiency goals or thoroughness goals (Hollnagel, 2017). Recently, Hu and colleagues (2020) tackled the paradoxes of safety head-on and proposed three that are driven by changes in technology, information, and structures: (1) automation versus human agency, (2) data versus information, and (3) individualisation versus collectivism. Altogether, safety appears full of contradictions and seemingly impossible situations that employees, and particularly leaders (as key decision makers) must resolve.

However, the nature of paradox is only just beginning to make its way into the safety field. In management science, it has long been established that traditional leadership theories and models tend to ignore paradox, which in light of the modern world of work, is to their detriment (Denison, Hooijberg & Quinn, 1995). In the world of safety, the notion of 'safety first' and even 'zero harm' implies that competing goals should be traded off against each other; or put simply, that safety must 'win' over other objectives like production and efficiency. Leaders, through behaviours such as role modelling, inspiration, vision, and recognition, must continuous exert a counterpressure that promotes the singular importance of safety (Zohar, 2010). But is this realistic, or even desirable? After all, organisations don't exist to be safe, but rather to produce, and to do so in safe ways to ensure long-term business viability (e.g., social licence to operate, sustainability of throughput, staff engagement and morale). In short, the modern business must produce AND be safe.

From this perspective, we developed a cutting-edge safety leadership program based on the ideas and theories of paradox. Such an approach represents the next 'step change' in safety leadership because it embraces the complexity of modern organisational life and the significant challenge of leading safe work in the context of declining resources, alternative viewpoints, and shifting priorities. In this paper, we first articulate the history of safety leadership models and theories, building a compelling argument as to why a new safety leadership approach is needed. Next, we summarise the landscape of paradoxical safety leadership. Then, we describe the training program development. The discussion concludes with theoretical and practical implications for safety leadership interventions into the future.

A brief history of leadership and safety

The phrase 'safety leadership' first appeared in the scholarly literature in the mid-1980s and early 1990s, through conference publications by safety engineers and other

industry professionals (e.g., Cosad et al., 1998; Pater, 1984; Rosenfield, 1980). Definitions of safety leadership at that time were largely informal and atheoretical, reflecting the practitioner-centric audiences and industry-driven research context. For example, Carrillo and Simon (1999) described safety leadership as a 'grass roots' style of leadership that focusses on consultation, participation, and establishing safety as a core value and cultural assumption, as per Edgar Schein's writings on organisational culture.

Also in the 1980s, Dov Zohar coined the phrase 'safety climate', which emphasised the role of management actions in driving safety performance, through creating shared behaviour-outcome expectancies among workers. These expectancies concerned the value and priority of safety relative to other demands like production and efficiency (Zohar, 1980; Zohar, 2000). Management commitment to safety, a common dimension of safety climate (Flin et al., 2000), was thereafter established as a safety leadership-esque construct. To this day, it remains unclear how safety climate is distinguished from safety leadership (Molnar et al., 2019; Oah et al., 2018).

In 1995, an early safety leadership concept was explored by Simard and Marchand. Building on the original propositions of Heinrich (1931) and industry consultants regarding the importance of supervision in leading safety outcomes, the authors investigated the effects of supervisory practices on safety. Although the term 'safety leadership' and even 'leadership' weren't mentioned, Simard and Marchand (1995) showed that a participatory style of supervision (involvement in safety activities) predicted positive safety performance among workers.

In 1999, Hofmann and Morgeson explored the effects of a general leadership theory, leader-member exchange, on safety communication and accidents. They argued that higher levels of organisational support and quality leader-member relationships would activate

norms of reciprocity, leading to greater willingness among workers to speak up about safety. The findings suggested that investing in genuine and high-quality relationships at work could improve safety performance.

It wasn't until 2001 that O'Dea and Flin published on safety leadership in the mainstream safety science literature. Safety leadership was loosely defined as a form of 'participative management' whereby leaders became actively and visibly involved in safety activities, and conducted frequent, informal communications between workers and management about safety. Open-ended survey comments revealed four themes or dimensions of safety leadership among offshore oil and gas managers: visibility, relationships, workforce involvement, and proactive management (O'Dea & Flin, 2001).

The seminal study done by Barling and colleagues (2002) was the first peer-reviewed article to coin the term 'safety-specific leadership'. In this study, the construct was safety-specific *transformational* leadership, which reflected a domain-specific application of Bass and Avolio's full range leadership model (1989). A definition of safety-specific transformational safety leadership is: "leaders who inspire, intellectually stimulate, and consider workers as individuals in the context of safety" (Vignoli, 2018). Barling's study was the first to explicitly advocate for a split between general leadership and safety-specific leadership.

At the same time, Zohar had branched out to explore leadership in safety. He approached the issue from both a general leadership perspective *and* a safety-specific leadership perspective. In Zohar (2002a), the effects of *general* transformational and transactional leadership on safety climate and injuries were found to be moderated by the leader's perceived safety priority. In Zohar (2002b), this evidence was used as the basis for a facet-specific measure of transactional safety leadership. Workers were asked to recall the

nature of interactions with their superior, and the responses classified into either safety-oriented or production-oriented, or both. An intervention was designed to increase the frequency of safety-related transactions between supervisors and leaders, which improved safety performance. Thereafter, research on both general leadership for safety and safety-specific leadership exploded. Of note, safety-specific leadership has expanded to include not only the full-range leadership model, but also more nuanced and bespoke models derived from qualitative research.

The next major development in safety leadership was applying a contingency or situational approach (Casey et al., 2017). Known as the LEAD model, which stands for four bundles of practices that leaders show depending on the work context/situation (Leverage, Energise, Adapt, Defend; Casey et al., 2019), the idea of situational safety leadership is appealing because it enables leaders to adopt a tactical view. For example, high risk environments require a defensive approach founded in prevention and stability. In contrast, the successful implementation of a safety-related change requires inspirational and visionary behaviours that promote flexibility. An interesting aspect of the LEAD model is the combination of seemingly contradictory leadership styles to manage difficult safety situations, such using a defensive or compliance-oriented approach in combination with behaviours that promote flexibility. In short, LEAD could be extrapolated and enhanced through the application of paradox theory. We unpack this proposition in the next section.

Paradoxical safety leadership

A paradox is situation where there are two or more contradictory goals. As described previously, paradoxes are commonplace in the organisations of today, and have especially infiltrated safety management.

Leaders are constantly battling with competing priorities in organisational life (Chang & Brodt, 2019), which they typically manage by choosing one over another (Jahanmir, 2016). This strategy often generates rewards in the short-term (such as increasing output or boosting efficiency), but ultimately fails to deliver over the long-term as the tension resurfaces at a later date, or potentially becomes an unresolved ‘latent condition’ that creates a future hazard for workers at lower organizational levels to manage. A paradoxical approach to leadership argues that leaders should support competing priorities by harnessing the constant tensions and complementary forces, enabling the organisation to continuously improve over time (Smith & Lewis, 2011). A paradoxical approach is powerful because it harnesses creativity, emotional intelligence, and flexibility to create solutions that combine or integrate seemingly incompatible goals, and catapult organisations forward into new realms of performance and capability (Lavine, 2014).

Accordingly, paradoxical safety leadership should consider the tension between safety and production, as well as tensions between competing yet interrelated safety demands and processes that are experienced by leaders. Each tension has corresponding leader behavioural strategies. The literature suggests that a paradoxical safety leader employs a "both-and" strategy where the leader aims to achieve competing demands simultaneously and over time. A paradoxical leader presents the underlying unity of two sides of the paradoxes, emphasizing the importance of both rather than their contradictions (Schad et al., 2016). Applying to paradoxical safety leadership, our conceptualization implies that the role of safety leaders is not to promote safety over other competing priorities but to create synergy and alignment between safety and other organizational goals (e.g., productivity, profit). A paradoxical safety leader sends out the message that safety and production are equally important, and should be synthesized and integrated, rather than differentially prioritized or ‘juggled’ based on their importance at the time.

Practically, this means that leaders must learn to integrate, combined, and unify different tensions that exist within safety. Studies in general leadership have already shown that managers routinely ‘work through’ paradoxes by firstly accepting them, then looking for ways to achieve goals together, separating them structurally or sequentially, or making a cautious and considered trade-off if required.

In the next section we describe out method to develop a paradoxical safety leadership program specific to the explosives manufacturing sector. We also summarise key concepts and tools that the program teaches participants.

Industrial context

We partnered with a large, multinational mining services manufacturing and professional services company, headquartered in Australia. This company has operations all over the globe and employs approximately 15,000 workers. Revenues are in excess of $5 billion per year. The final program is intended for implementation across a diverse range of cultures and geographic locations. Accordingly, our consultations during program development reached across multiple locations, such as Australia, South America, the United States, Asia, and Canada.

Program development

The training program was developed through a combination of academic research, pre-existing document review from our partner organisation, and direct consultation with both incumbent frontline safety leaders and their managers. Specifically, we reviewed and compiled current scientific knowledge on safety leadership and paradoxical theory, building a set of concepts and tools for inclusion in the program. Our partner organisation supplied several safety leadership documents based on previous research projects conducted with ‘pockets of excellence’ across the business. Previous interviews, focus groups, employee

surveys, and thematic analyses were content analysed and key leadership challenges, case studies, and best practices extracted. Finally, we conducted 12 extended interviews (between 1-1.5 hours in length) with frontline, middle, and senior managers in the partner organisation. Before each interview, the participants completed a short rating questionnaire that asked them to rate various 'tensions' in terms of frequency and difficulty. These data were then shared in each interview and discussed at length to prompt reflection and detailed examples of how paradoxes, tensions, and contradictions were managed. All these data were them combined to formulate a detailed training design schematic that was reviewed and approved by the partner organisation. Thereafter, prototype training materials were built and refined iteratively with the support of our partner organisation.

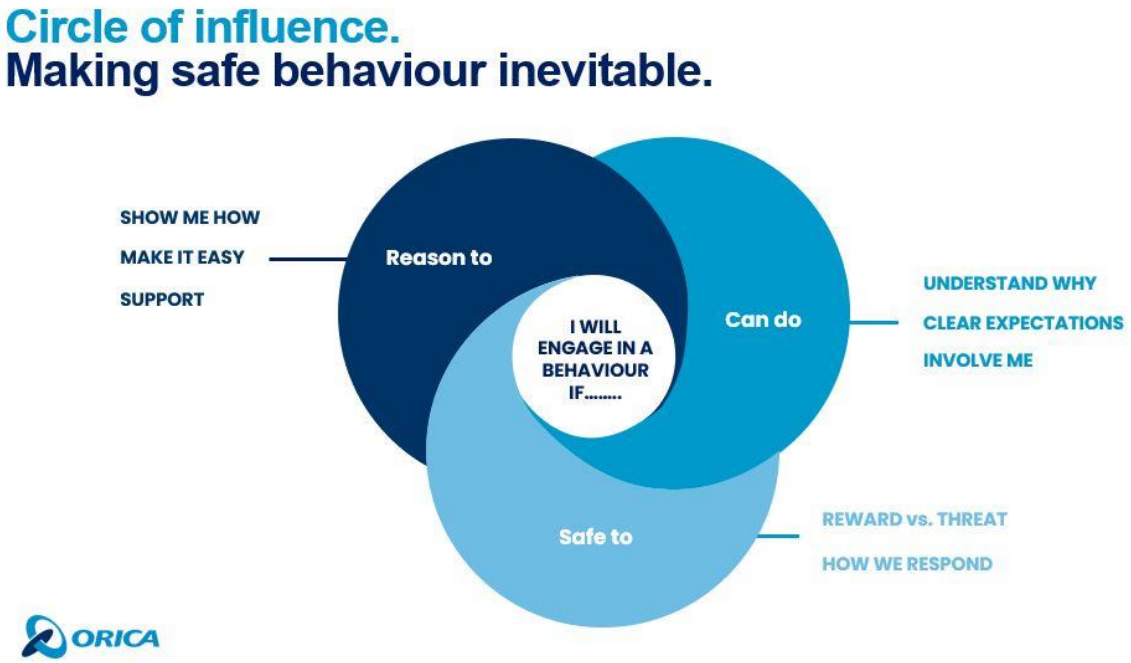
Program overview

The current program consists of three modules, of approximately three hours length each (eight – nine hours total program length). Each of these modules are explained further in the sections that follow. Table 1 below summarises the key concepts trained in each module.

Module	Trained concepts
Module 1 – what does 'good' look like	Deep compliance, safe adaptation, safety voice, practical drift, work-as-imagined versus work-as-done, safety silence motives, safety motivation and engagement, and psychological safety.
Module 2 – leading safety; your 'how to' guide	Employee engagement, trust, self-efficacy, safety motivation, and psychological safety.
Module 3 – the safety leadership 'survival guide'	Safety tensions/contradictions, paradoxical safety leadership, and the vicious and virtuous cycles.

Module 1 – What does 'good' look like?

The overarching learning objective of the first module is to introduce contemporary ideas about safety leadership, employee engagement, and safety performance, with a view to enlightening participants regarding how 'good' leaders are formed and shaped. Participants initially learn about the three main safety behaviour domains that they should seek to achieve among their teams: deep compliance, safety voice, and safe adaptation. Next, detailed explorations of each safety practice is undertaken, with links made to leadership practices that encourage better demonstration of each type of practice. A core program model – the 'circle of influence' – is introduced. This model integrates multiple psychological theories, including: self-efficacy (Bandura, Freeman & Lightsey, 1999), psychological safety (Edmondson & Lei, 2014), and safety motivation (Neal, Griffin & Hart, 2000). We also incorporated a theory of proactive work motivation (i.e., can-do, reason-to, safe-to; Parker, Bindl & Strauss, 2010). Through applying this model consistently throughout the program, participants learn how to influence safety performance in deeper and more sustainable ways.



Module 2 – Leading safety; your 'how to' guide

In the second module, the objective is to outline a new model of safety leadership called the 'three Ps' (promote, participate, protect; Hu et al., 2021) and embed it within the broader theories on psychology and safety. The 'circle of influence' is explained in more detail, with linkages to major psychological theories such as self-determination theory (Deci & Ryan, 2000), self-efficacy (Bandura et al., 1999), and psychological safety (Edmondson & Lei, 2014). Thereafter, high level safety leadership tactics are explained, and participants invited to explore 'moments that matter' for their leadership (i.e., when and how to apply safety leadership in specific work contexts). The module concludes with an extended and detailed discussion around trust (benefits, risks, and building/repairing trust).

Module 3 – the safety leadership 'survival guide'

The final module aims to provide a troubleshooting guide to leaders as they apply their newly learned practices and encounter tensions, contradictions, and competing goals in the workplace. It includes more advanced concepts and theories stemming from paradox theory, and encourages participants to embrace tensions at work rather than making short or quick fixes that do not solve the underlying issues. To do so, we drew on the concept of a 'paradoxical mindset' (Liu, Xu & Zhang, 2020), which suggests that leaders should seek to understand tensions, look for ways to integrate or simultaneously achieve multiple goals, and identify when to make conscious trade-off decisions. The module concludes with several organisationally-specific case studies of paradoxical safety leadership and open discussions to build paradoxical mindsets among the participants.

Training transfer

Safety training transfer refers to the application, generalisation, and maintenance of learned skills and knowledge following a training event in the workplace setting (Krauss et al., 2012).

Given most training fails to be applied back in the workplace, incorporating strategies to boost transfer for our program was essential. Specifically, we leveraged a new model of safety training transfer by Casey and colleagues (2021), which emphasises the role of evaluation and the involvement of supervisors/managers in following-up and coaching trainees after participation in training events. The managers of training participants will be involved in post-training conversations regarding what has been learned, what can be applied, and on-the-job coaching. Further, the managers will directly cofacilitate the training modules in their respective regions, adding further weight and influence to the importance of the training materials. Additional transfer tools include safety leadership focus questions (i.e., questions designed to be used as conversation starters and generate opportunities to apply learned skills) and various printable posters and templates (e.g., the circle of influence graphic with corresponding strategies to drive improved safety performance). The evaluation and measurement framework is comprehensive, and involves collecting pre-post data from trainees, their direct reports, and their managers. Multisource data will help to robustly evaluate the program and eliminate competing explanations regarding program effects/outcomes (Spector, 2019).

Discussion

This safety leadership program represents current best thinking in science and practice. Derived from cutting-edge concepts and research such as situational safety leadership, paradox theory, proactive work motivation, and many leading psychological theories and models, the program represents a significant shift forward in the evolution of leadership development for high-risk industries. Currently, the program is being prepared for broader implementation and baseline measures are likely to be collected.

Theoretically, the literature is largely silent on the issues of paradox in safety. Apart from a recent article by Hu and colleagues (2020) on competing and conflicting demands in industry, to our knowledge, there are currently no other published works on safety leadership that make reference to paradox. As work becomes increasingly complex, resources even scarcer, and multiple priorities surface, identifying and knowing how to manage paradoxes will become increasingly important. Especially in the management of safety, paradoxes are ubiquitous. Alarmingly, many contemporary safety theories and frameworks suggest that the best way forward is to engage in trade-offs (e.g., Hollnagel's [2017] efficiency-thoroughness trade-off). Yet, management science suggests that trade-offs should be done sparingly, and only if more sophisticated strategies like integration do not work or are impractical. The future of safety depends strongly on the effective management of tensions and contradictions. Program developments such as the one described here will be essential to elucidate the practices the underlie effective safety leadership through resolution of paradoxes. Our investigations with leaders at the participating organisation showed that not only are leaders experiencing paradoxes daily, they differ greatly in terms of confidence and ability to successfully resolve them.

Safety training transfer is a significant problem for organisations, as studies have shown that not all of what is taught is successfully applied or maintained (Krauss et al., 2012). Numerous barriers exist to embedding safety training into the workplace, which range from safety having a poor reputation, through to perceptions regarding how voluntary or mandatory safety training is (Casey et al., 2021). Through this program, strategies to boost training transfer were developed and integrated. Recognising the important role played by managers, we argue that leaders of trainees should be more actively involved in delivering and supporting the embedment of safety training. Such efforts go beyond tokenistic 'program openings' done by senior leaders in traditional training settings. Providing managers with a

checklist of trained skills and concepts, actively involving them in the delivery of training programs, and expecting them to engage in on-the-job verification and coaching of trainees should exert a powerful effect over training application, and generate higher return on investment for our partner organisation.

In conclusion, this safety leadership program represents innovative thinking in how to take the conversation forward. Such innovation is urgently needed given injury rates and safety performance rates are stalling, and in some jurisdictions, reversing. Rising complexity, uncertainty, and dynamism at work means that safety cannot be prioritised in a vacuum; rather, it must be integrated and jointly-optimised along with the myriad of other important work priorities and goals.

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