THE FUTURE OF SAFETY & THE NEW VIEW REFRACTION

By Paul Stretton

Several new views of safety have emerged in recent years reflecting the desire to ensure that safety practice is fit for the modern workplace. These different views can create as much confusion as they do progress. An entirely new paradigm to consider safety practice is offered in a similar manner to how other scientific disciplines have evolved.

The founding principle within safety is to stop things from going wrong. The world that this creates is one we are familiar with. There are principles of prevention and assessments of risk. There are standard operating procedures and briefings. There are safety triangles (Heinrich, 1931) and models based on Swiss cheese (Reason, 1990) and dominoes (Heinrich, 1931). We should be proud and grateful for these advances. There are, however, an increasing number of alternative views for the practice of safety. To advance a new perspective does not necessarily require repudiating the past and present—a point often lost among "new view" advocates. The evolution of these new views has been organic but has resulted in an emerging field that can be confusing and contradictory. Another new view is not required; an entirely new paradigm in which to consider safety practice is.

New Views of Safety

The first new view within safety was behavior-based safety (BBS). It emerged as a popular approach to improving safety performance during the 1970s and 1980s (Anderson, 2005). The theoretical underpinnings of BBS have been traced to Herbert Heinrich and his research during the 1930s. Within this research, Heinrich suggested that 88% of incidents were caused by unsafe acts of persons, 10% by machine failure and 2% were unavoidable (Heinrich, 1931). The notion that the human is the hazard was born.

Unsafe acts have subsequently been divided into errors, the unintended or substandard actions, and violations, deliberate deviations from known rules or procedures (Reason, 1997). The application of these subtypes of human failure helped create the notion of zero harm and the goal of total safety perfection.

One of the most prominent new views has been proposed by Erik Hollnagel (2014), introducing the concept of Safety II. Hollnagel called the classical approach Safety I. In contrast, Safety II considers safety to be defined by the notion that as many things as possible go right. In so doing, Hollnagel created a dichotomy in terms of what we consider to be safety in the workplace. This alternative start point represents a significant shift in how we attempt to understand organizational performance. This shift has been explained in several ways. A common analogy is to consider how effectively one could learn about sharks by only studying shark attacks. Classically, safety focuses on the shark attacks. In contrast, the value of learning from what goes well is clear. If seeking to understand the true nature of something, whether it be sharks or work, one can learn only a limited amount from rare, spectacular or tragic events alone. To be successful, we should consider how success is achieved, not only look to see how we have failed previously.

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Safety II is not solely interested in recognizing and understanding safety through a positive lens. Hollnagel advances several alternative ideas regarding causation and the role of humans. For example, he states that humans can provide flexibility within a system that creates resilience and potentially have a positive impact on safety outcomes. This is a significant change from considering humans to be hazards as classical behavioral approaches propose. A more nuanced understanding of the relationship between the person and the system emerges.

Safety differently is another powerful brand within the new view of safety (Dekker, 2017). Safety differently defines safety as the "capacity to be successful in varying conditions." Dekker also advances that "people are a solution to enable or facilitate," which is one of many nods toward Hollnagel's work. One aspect of safety differently that is noticeably different from Safety II is in the provision of a route for application. Dekker considers safety differently to be a revised mental model of safety wherein organizations learn from normal work and engage with workers who are exposed to risks to identify appropriate ways to manage the risks. While the idea of workforce engagement could hardly be considered a new principle within safety management, the more holistic view of organizational safety combined with a concept of grassroots change is an approach that has gained traction across many industries for good reason.

Safety III is a newcomer to the new view market (Leveson, 2020). The paper "Safety III: A Systems Approach to Safety and Resilience" was written largely as a direct critique of Hollnagel's Safety II. Within Safety III, Leveson defines safety as "freedom from unacceptable losses as identified by the system stakeholders. The goal is to eliminate, mitigate or control hazards, which are the states that can lead to these

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Vantage Point

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losses." As such, Safety III could be understood as a modern revision of classical safety from an engineering perspective, rather than as a wholly new perspective.

The New View Refraction

No longer is there a shared understanding of safety. Safety itself is defined in numerous ways. The emergence of the new view is exciting and inspiring. There is a lot of fantastic work undertaken by brilliant people who are passionate about improving the world of work. There is a clear desire to modernize our view of organizational safety. This should not be surprising given how much the nature of work has evolved since the main principles of safety practice became established across risk industries. But it has also created a range of ideas that are incohesive at best and in conflict at worst. Not only is this unhelpful, but the confusion is also likely to make progress less achievable for safety professionals.

Like a ray of light, the classical approach to safety has struck a philosophical or intellectual prism. From the pure white light of classical approaches are refracted a spectrum of associated but differing approaches to understanding safety (Figure 1). The classical approach to safety continues to forge its path of white light. Upon hitting the prism, we can now place the differing new views. The least refracted view, sporting a red hue, would be Leveson's Safety III. Next, there are behavior-based approaches to safety, depending on their ethos and overall goals. More traditional behavioral approaches seek to gain greater compliance of the workforce behaviors within the system.

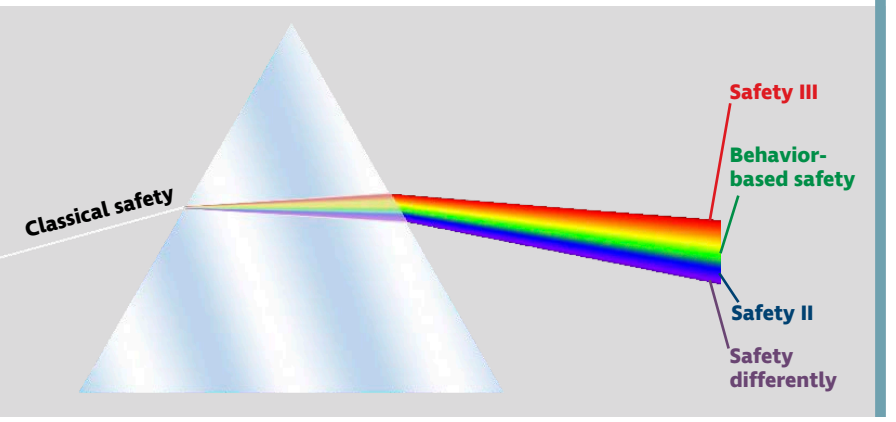
Safety II has refracted further still and finds itself nearer the blue end of the color spectrum. Safety is no longer only concerned with avoiding failure, and people can provide solutions, not just problems. Finally, safety differently shares much of the philosophical refraction of Safety II, but with a deeper sense of how this manifests within organizations.

Getting Away From the New View Refraction

If we accept the principle that the safety profession must review how it meets the needs of the modern workplace, as well as recognize that the current situation is confusing and incoherent, we need to explore an alternative conceptualization for the future of safety practice.

There are different ways to understand the nature of light. The refracted beam

FIGURE 1
THE NEW VIEW REFRACTION



of light acts as a wave. One can also understand light as a particle; this is the quantum view. Quantum mechanics and classical mechanics have different ways of understanding the nature of the world; they provide different insights but do not invalidate one another. For example, it was classical mechanics that helped put humankind on the moon, but this was abetted by the leaps quantum mechanics provided by way of computing. Differing scientific views can contradict and compete; they can also complement or coexist. This leads us to consider what this quantum view of safety may be.

The Quantum View of Safety

To some, proposing an entirely new paradigm for understanding safety practice, as opposed to a shift in perspective, may seem overly ambitious, if even necessary. It is not only physics that has experienced this kind of development; human sciences have as well, economics in particular.

Acclaimed economist Brian Arthur explained to a group of physicists at Santa Fe Institute the standard solution used by economists to explain expected decisions that people will make: perfect rationality. Perfect rationality means that the person will always make a choice that maximizes their utility or benefit. Arthur had been trying to challenge the dominance of perfect rationality. The physicists were shocked by the classical assumptions. The economists argued that without the assumption of perfect rationality, they would not be able to create equations to solve and determine the nature of the market. In return, the physicists wondered what the value was of solving problems not based on reality (Waldrop, 1993). Today, the irrationality of decision-making has become an accepted part of economic policy and decision-making. The classical, neo-liberal perspective of Adam Smith retains validity. It is now supplemented with additional tools and perspectives to help gain a greater degree of understanding. Consequently, an entirely new approach emerged. Safety needs its own Santa Fe moment (see Table 1, p. 40).

Systemic Dynamics

One of the most significant differences in perspectives is the dynamics of the system being understood. Many principles of classical safety have arisen from engineering. The relationship between engineering and safety is close. This has enabled significant advances in our approaches to safety practice. The tools developed within classical safety therefore tend to be linear in nature, such as the Swiss cheese model. This mechanistic viewpoint will often provide insight, however, it will not address the nature of complexity within the system.

The term "complexity" is used with ever-greater frequency within safety science. It is often used as a synonym to mean that the work is difficult. However, this is inaccurate. Typically, systems become more complex when they operate within imperfect information and in time-limited and emergent situations, especially those that are largely reliant on interpersonal relationships and where conflicting goals and high degrees of ambiguity exist. Embracing complexity within the quantum view of safety does not mean the work is difficult; it means it is different.

Safety Orthodoxy

As we have seen when exploring the variety of definitions of safety that have emerged, the approach advocated is

TABLE 1
CLASSICAL VS. QUANTUM VIEW OF SAFETY

Principle	Classical view	Quantum view
Systemic dynamics	Linear	Complex
Safety orthodoxy	Outcome based	Process focused
Nature of events and processes	Isolated	Relational
Approach to risk control	Consistent	Flexible

founded upon the outcome achieved. The classical view, as well as Safety III, aim to reduce unacceptable losses, whereas Safety II and safety differently are anchored to the notion of success. Given the nature of the subject area, the importance of the outcome should not be minimized. Behind each alert, case study and statistic are a personal story. It is because of the hugely important personal nature of risk management that we should consider deeply the nature of the system developed to keep people from coming to harm.

Safety, or the absence of it, is an emergent property of the system. Safety is not the function of the system, rather it is a characteristic. Developing the approach to safety based on the nature of the outcome is akin to trying to understand meteorology based on how often you use an umbrella. We want to ensure that people do not get caught in a storm, and we could furnish people with appropriate clothing for inclement weather, but that does not help us to understand the characteristics of an occluded front and what created those conditions. From a classical perspective, reacting to specific outcomes and learning from the benefit of hindsight may be appropriate. From the quantum view, the primary interest is in attaining a deep understanding of the processes that produce a range of outcomes. This will help to generate learning that will allow risk management approaches to create the conditions most conducive for successful outcomes.

Nature of Events & Processes

Organizations are often explained by a hierarchical organization chart. This reinforces the linear nature of classical safety. By acknowledging the importance of complexity within the workplace, the quantum perspective does not consider acts in isolation or in simple chains. Agency only exists when considered in relation to the environment that it is operating within. Organizations have a multihuman interface that requires greater exploration and greater investment to achieve reliability. The degree of adaptive behaviors within systems is surprising. The variation of decision-making has been consistently observed within research, which Kahneman et al. (2021) call "noise" and Rasmussen (1997) alludes to as "Brownian movements." Even a process that would be considered simple can display considerable variation in performance. For example, a study into asylum decisions showed that one judge admitted 88% of applicants, while another admitted 5% (Schoenhaltz et al., 2007). In a system where these variations impact upon subsequent decisions, to expect a linear process is as robust as reading tea leaves.

Classical safety attempts to offer deterministic analysis. It provides comfort with such certainty by offering an analysis where cause and effect are easily identified. There is a saying, however, that one cannot step in the same river twice. One's feet may still be wet, but what occurs around them is constantly changing. The action of one part of the system will affect another, potentially with that effect being unknown to either agency. To attempt to offer deterministic analysis, despite the comfort that the certainty provides, is to ignore the reality that the quantum perspective enables us to observe. The quantum perspective, therefore, offers only probabilistic analysis (Stretton, 2021). It is an approach that requires safety professionals to become comfortable with being uncomfortable and certain about uncertainty. This will enhance rather than impair organizational learning and encourage us to be curious about the changes initiated in the name of improving safety performance.

Approach to Risk Control

Within every workplace there will be some activities that are more complex than others. Some will require a high degree of standardization. There will be occasions that do not lend themselves to being entirely driven by protocols and require the need for the workforce to adapt successfully (Vincent & Amalberti, 2016). Classical safety, predicated on the notion that humans are hazards, seeks to ensure their compliance to the established rules and systems.

Embracing the nature of complexity within the workplace as well as the research that identifies the extent to which human decision-making varies means that we must consider humans to be more than simple executors of logic functions. They are not simply the cogs in the organizational machine. Much of classical safety is founded on principles of Taylorism, but the modern workplace is much more than a conveyer belt (Hollnagel et al., 2015). This means it would be injudicious to adopt one set approach to risk management. To be successful, much greater consideration must be given to the dynamics of the system that require managing.

In workplaces or tasks where there cannot be room for individual variation (e.g., a nuclear power plant), the classical approaches would be most appropriate. In all systems, there would need to be a comprehensive framework that manages variation to acceptable levels. However, people are not merely hazards and their role is not simply to comply. There are some environments that require people to adapt but do so successfully and safely. For example, trauma surgeons cannot be expected to only follow explicit protocols. It would neither be desirable nor safe. Therefore, the consideration for the safety profession is to understand the context in which the work is being undertaken. We need to consider the role of adaptation in the system required to produce acceptable and safe outcomes and how a more flexible, nuanced approach can be developed. The work by Gary Klein within naturalistic decision-making is a good example of exploring how expertise can be developed and supported in environments that require people to adapt successfully in safety critical environments, such as firefighters, police and petrochemical industries (Klein et al., 1993). Systemic flexibility can provide additional levels of safety in the modern, complex workplace.

Conclusion

There is a desire to develop an approach to safety practice that is suitable for the modern workplace. There are many interesting approaches proposed that have merit but that have also sown the seeds for confusion and tribalism. They also fail to recognize the advances

that our classical approach has provided. The more complete solution is to not consider new views as a choice or part of a dichotomy. The classical approach to safety is valuable and beneficial. In a similar manner to the paradigm shift that quantum mechanics provided physics (without challenging the validity of classical Newtonian mechanics), safety practice requires an entirely different way to understand safety in the workplace—one that creates a conceptual space to integrate risk management effectively throughout an organization. An approach that has a rich, contextual relationship to both the people working and the system they are working in. It is a viewpoint that migrates safety professionals' thoughts from asking "who?" to asking "how?" A proud history of industrialized failure avoidance can be further enhanced by the dawning of an era of professionalized high performance. **PSJ**

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