Safety 2.1

The Safety Envelope

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Excerpt from Part 1. For the complete chapter and references, see the book.

Part 1

Theoretical Framework

Chapter 1
Introduction to the Safety 2.1 Framework

Health and safety is striving to establish itself as a recognised profession. Traditional hallmarks of a profession include specialised knowledge and education, ethical standards and a degree of autonomy based on expertise. However, the field of health and safety often struggles to meet these standards, particularly in aligning theoretical knowledge with practical application.

A key challenge is the disconnect between academic research in health and safety and its implementation in practice. This gap is illustrated by the theoretical concept of 'Safety 2', an innovative approach developed by thinkers like Erik Hollnagel, Sidney Dekker and others. While this approach has been enthusiastically received by practitioners, they often struggle to translate its principles into tangible changes in safety practices. This disconnect is eloquently described by Dekker,[*] who notes the tendency for practitioners to seek prescriptive solutions rather than engaging deeply with new

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[*] Dekker, S. (2018). *I am not a Policy Wonk*. Blog via www. safetydifferently.com.

theoretical frameworks and adapting them to the complexities of real-world situations.

Another factor is that most safety practitioners operate at a technician level. While professionals are, as noted, generally characterised by advanced education, adherence to ethical standards, and a degree of autonomy in decision-making, technicians focus more on practical, technical skills. This dichotomy is not so much an issue among entry-level safety advisors, but it often leads to a de facto focus on technical compliance over comprehensive safety strategies at senior management level.

The consequences of this divide are particularly noticeable in industries like construction. For instance, in New Zealand, major construction firms demand detailed 'Site Specific Safety Plans' (SSSPs) from subcontractors. These plans, often voluminous and procedural, are mistakenly believed to be a legal requirement. This underscores a broader misunderstanding: the notion that safety can be assured primarily through procedural rigour, without a nuanced understanding of the shared responsibilities and the dynamic nature of safety.

This notion has far-reaching implications for overall safety management. Safety practitioners are often more interested in the newest off-the-shelf tools, and using legalistic arguments, rather than progressing past the old-fashioned safety practices.

Dekker et al.[*] state that this traditional framework is based on linear cause and effect. Practitioners and line managers focus on what went wrong, leading to an injury, and then work backwards in a

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[*] Dekker, S., Cilliers, P., & Hofmeyr, J. H. (2011). The complexity of failure: Implications of complexity theory for safety investigations. *Safety Science* 49(6): 939–945.

straight line to identify the root cause. They search for what Dekker calls the "eureka part" that ultimately failed, following a reductionist method.

Dekker continues to contrast this with Safety 2-thinking: "Analytic reduction cannot tell how a number of different things and processes act together when exposed to a number of different influences at the same time. This is complexity, a characteristic of a system. Complex behaviour arises because of the interaction between the components of a system. It asks us to focus not on individual components but on their relationships. The properties of the system emerge as a result of these interactions; they are not contained within individual components."

This book aims to bridge this crucial gap in the field of safety. While not an exhaustive exploration of every aspect of safety, it seeks to highlight the important connection between theoretical insights and practical applications. Notably, it emphasises the synergy between the profound contributions of theorists and the real-world challenges faced by practitioners. Effective feedback mechanisms are essential for theorists, allowing them to refine theories that may falter over time. Conversely, practitioners should actively incorporate the latest theoretical advancements to enhance safety practices.

As someone who proudly identifies as a practitioner, yet has had the privilege of collaborating with theorists, the author primarily addresses fellow practitioners. The purpose is to provoke thought, challenge existing safety practices and contribute to the advancement of the safety profession as a whole.

Chapter 2
Safety 1 vs Safety 2

There are currently two very different approaches to safety management. It is not always clear if this is the result of a deliberate choice or not; however, the approaches are very different. Andrew Hale and David Borys* articulate the two approaches very clearly and the following is an almost verbatim extract from their report to the Institution of Occupational Safety and Health (IOSH) Research Committee.

They refer to the different approaches as "Model 1" and "Model 2" and summarise the models as follows:

Model 1

This model is rooted in scientific management. It is rationalist and prescriptive in its approach, and it sees rules as the embodiment of the single best way to carry out activities covering all (most) known contingencies. Rules are devised by experts to guard against the

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* Hale, A., & Borys, D. (2013). Working to rule or working safely? Part 2: The management of safety rules and procedures. *Safety Science* 55: 222-231.

errors and mistakes of fallible humans at the sharp end (the operators), who are more limited than the experts in working out the best way to do things.

Rules are essentially created top-down, should be decided in advance, and be based on task and risk analyses. Once devised, they are 'carved in stone', communicated to and imposed on the workforce by management. Violations (intentional deviations) and errors (unintentional deviations) are seen as essentially negative actions that should be countered and suppressed, as a last resort through punishment.

Rules are to be documented in manuals or databases and consist mainly of abstract must-statements. Language is formal and precise to avoid ambiguity. It is common to include extensive sections defining terminology and referencing sources. It is then made available to the workforce in the form of instructions, incorporated in training and signed for by operators to signify their intent to comply.

Local managers and supervisors are expected to take their enforcement roles seriously and non-enforcement of the rules may also be subject to sanctions.

Model 2

This model sees rules as patterns of behaviour, socially constructed, emerging from the experience of those carrying them out. They are characterised as local and situated in the specific activity, in contrast to the written rules, which are seen as being at a generic level, necessarily abstracted from the detailed situation to be able to generalise them across essentially disparate local situations.

The Model 2 view of rules is essentially bottom-up and dynamic. It recognises that written rules, except for a few 'golden rules' typically prescribed by law or industry best practice, require a process of translation and adaptation before application to any given, specific situation. This implies that written rules should not be at the detailed, action level but, at most, at the process level.

The real experts in this conceptualisation are the operators, whose ability to conduct and navigate this dynamic process of negotiation and construction of rules is seen as an essential part of their skill and identity – and they should be trained and developed to fulfil this expectation. A likely response to attempts to impose rules from outside of this operational group is resistance. While informal and group rules are seen as violations by those on the outside, they are seen as skilled adaptations by operators.

Rules are seen in model 2 as support and guidance for the expert. However, except for the few 'golden rules' mentioned above, they are not something requiring strict compliance and no substitute for competence, unless the operator is a novice/not yet fully skilled.

'Violation' is therefore seen as essential in specific cases where the rule does not match the reality and is part of applying the mature operator's tacit knowledge in the process of carrying out work, not a form of defiant behaviour.

Enforcing the rule without allowing for adaptation to the local reality is seen as punitive, demeaning and destroying trust, and it is scoffed at by experienced operators, at least in private.

Based on this analysis, Hale and Borys postulate the following 'principles':

- Rules, documented or not, are necessary, but they are not the only or even the preferred solutions to ensure control.

Design, competence and social control are also valid alternatives to the written word.

- Rules influencing safety should be combined with rules on quality, productivity, sustainability and so on to reduce the size of the rulebook.
- Rule violation is a signal that all is not well with the rule system and that punishment, or discipline, may be inappropriate. Revisiting the possible disconnect between the rule and the task reality may shed more light on the violations. Compliance is important, but understanding non-compliance is more important.
- The participation of competent and motivated rule users in making and improving rules is essential. Experienced operators are the experts in rule use in real-life situations.

The model is hierarchical:

1. At the top are goals specifying only the outcomes.
2. Next come process rules concerning how to translate the goals into acceptable processes.
3. Finally, action rules (exact behaviour prescriptions) at the bottom restrict the freedom of choice of rule users.

Rules at the higher end of the hierarchy (goals and process rules) place more trust in the rule users to translate them to each situation. On the other hand, rules at the lower end of the hierarchy (action rules) lead to more exceptions and 'violations' in different situations.

Rulemaking is a balance between these two concerns.

- In most situations, there is more than one way to carry out a task safely. What matters is keeping within a 'safe

envelope' of behaviour. For competent rule users, rules can be phrased simply as guidance, unless the operator knows a way of behaving that is at least as safe and achieves the same result. This could reduce the number of 'golden rules' which must be followed exactly.

- People experienced in using their judgement to decide the appropriate behaviour in their normal work are more likely to be able to work out what to do when faced with unexpected and unpredicted situations.
- In activities where people have to work together, there is a stronger case for a more central formulation of rules, so that everyone can predict what teammates will do. This can be done at an organisational level, such as determining traffic systems, shared site rules and emergency procedures, or it can be agreed by the social group.
- Rulemaking can never be abdicated; it remains an organisational process. Even if rules are produced in a bottom-up manner, managers must ensure rules do not drift to the boundaries of the safe envelope.
- All rules have a lifespan and become potentially outdated over time. All rules must regularly be reviewed to avoid them becoming disconnected from the reality of task demands.

Theory and Practice

The Safety 2 theory presents an intuitive yet sophisticated approach to workplace safety. Its core premise is often readily acknowledged and accepted by many in the safety management industry. However, the real challenge in leveraging the Safety 2 theory lies not only in its conceptual acceptance but also in the intricacies of its application in real-world scenarios. It is imperative

to gain a comprehensive and nuanced understanding of its fundamental principles when implementing this theory.

A pivotal aspect is its reliance on the concept of complex systems and, more specifically, complex adaptive systems. This concept is crucial because it acknowledges that organisations are not static; they are dynamic and continually evolving. The following chapter, while steering clear of an overly academic or technical narrative, aims to demystify these core principles. By doing so, it provides a fundamental understanding that is indispensable for those looking to apply the theory in a practical, impactful manner.

This application is in essence the practical application of Safety 2, hence the extension to Safety 2.1.

The next chapter seeks to start equipping practitioners with the necessary insights not only to understand the complex nature of their organisational systems but also to navigate and influence these systems towards a more proactive safety culture. This understanding is key to unlocking the full potential of the Safety 2 theory, turning it from a conceptual framework into a tangible, effective tool for improving workplace safety.

Chapter 3
Complex Adaptive Systems

The Safety 2.1 approach in this book is based on complex adaptive systems theory, focusing on how safety elements interact dynamically and adapt in real-world situations.

Richard Pascale,[*] a pioneer in the study of complex adaptive systems, has highlighted a paradigm shift in our comprehension of organisational operations over the previous two to three decades.

During the 1980s and 1990s, organisational focus was predominantly on performance enhancement as evidenced by methodologies such as total quality improvement, kaizen, just-in-time, and re-engineering. However, Pascale proposed that our understanding of how business works has moved beyond these concepts. He and others, like Saskia Harkema, [†] critiqued this approach, noting its reliance on linear cause-and-effect assumptions. It assumes that if something is not performing as it

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[*] Pascale, R. T. (1999). Surfing the edge of chaos. *Sloan Management Review* 40(3): 83–94.

[†] Harkema, S. (2003). A complex adaptive perspective on learning within innovation projects. *The Learning Organisation* 10(6): 340–346.

should, all that is required is to discover what went wrong, correct it and success will follow.

Such linearity is not a feature of complex systems, for example health and safety systems. Health and safety is inherently subjective, and outcomes stem from multifaceted interactions among various elements – people, the environment, social dynamics and others. These interactions are unique and non-repetitive, making it impossible to comprehend the system fully by analysing individual components in isolation.

Complex adaptive systems, a distinct category within complex systems, is distinguished by the adaptive and learning capabilities of its components. Over time, complex adaptive systems evolve specific rules governing agent actions and their interconnections, resulting in diverse aggregate outcomes. These outcomes, or 'emergent properties', are the manifestations of the interplay of agents' behaviours.

Key Characteristics of Complex Adaptive Systems

The book expands on the five defining characteristics of Complex Adaptive Systems (CAS): emergence, self-organisation, adaptation and evolution, non-linearity, and the edge of chaos. They are central to understanding how organisational safety behaviour forms, stabilises and shifts. It is not only theory, understanding these are instrumental in operating within a CAS.

These characteristics collectively contribute to the dynamic and intricate nature of complex adaptive systems, making them a fascinating subject for study and analysis in the safety management field.

Perceiving safety management as a complex adaptive system offers a revolutionary perspective. It acknowledges that safety is not a static target but a dynamic, ever-evolving process. This process

continuously adapts and transforms with each interaction and decision within the organisational ecosystem. Unlike traditional linear models that emphasise direct cause-and-effect relationships, the complex adaptive systems approach embraces a holistic view. It recognises safety as an emergent property, born from the intricate web of interactions and relationships within the system.

This paradigm shift necessitates adopting a systemic approach, where the interdependence of various components is acknowledged. In such a framework, changes in one part of the system can ripple through and impact the entire organisation. It acknowledges that learning and adaptation occur at a systemic level, transcending individual efforts. This perspective fosters a culture where learning is shared and integrated into the organisational fabric, to enhance the collective knowledge base.

Moreover, the self-organising principle of complex adaptive systems empowers employees at all levels. It encourages autonomy and decision-making at the ground level, fostering a sense of ownership and responsibility towards safety. This decentralised approach allows for more agile responses to safety challenges, as employees are more attuned to the nuances of their immediate environment and can take swift, informed actions.

In such a system, the emphasis is on the collective over the individual. It is an acknowledgment that the whole organisation is more than just a sum of its parts. The interactions, shared knowledge and collaborative efforts contribute to a more resilient and adaptive safety culture. This approach to safety management aligns with the dynamic and ever-changing nature of organisations, ensuring that safety protocols and practices are not only responsive but also proactive in identifying and mitigating risks.

The integration of complex adaptive systems theory in safety management is thus a transformative step, moving away from rigid, prescriptive models to a more fluid, adaptive approach. It aligns with the realities of modern organisational dynamics and paves the way for a more holistic and effective safety culture.

The evolution towards Safety 2.1 epitomises this journey. It builds upon a robust theoretical foundation while primarily concentrating on the practical implications and real-world applications. This shift marks a pivotal move from theoretical understanding to actionable strategies.

Chapter 4
Safety 2.1 Theoretical Framework

The conceptual model presented here, termed Safety 2.1, evolves from the foundational principles of Safety 2 as proposed by Hollnagel et al.,[*] Dekker, [†] Conklin [‡] and many others. Hale and Borys are also in this camp. This iteration – 2.1 – adds to typical Safety 2 by uniquely integrating theory with practice, addressing a critical gap observed in earlier models.

Safety 2, and therefore Safety 2.1, in contrast to the traditional Safety 1 approach, places a significant emphasis on allowing workers to control how they will do work, rather than prescribing every detail. It recognises the complexity of work and allows for collaborative work methods.

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[*] Hollnagel, E., Wears, R. L., & Braithwaite, J. (2015). *From Safety-I to Safety-II: a white paper*. *The resilient health care net*: published simultaneously by the University of Southern Denmark, University of Florida, USA, and Macquarie University, Australia.

[†] Dekker, S. (2014). *Safety differently: Human factors for a new era*. CRC Press.

[‡] Conklin, T. (2019). *Pre-accident investigations: An introduction to organisational safety*. CRC Press.

Safety 2.1 specifically aims to address safety practice and can be contrasted with traditional safety practices – Safety 1 – as follows:

Behaviourism vs Complex Adaptive Systems: Safety 1 operates on a behaviourist model, emphasising shaping actions through reward and punishment and reinforcing specific behaviours for safety compliance. Safety 2.1, on the other hand, considers management as a complex, socially constructed system. It fosters change not just through direct interventions but by leveraging its inherent pattern-forming abilities, embracing the dynamic interactions and emergent properties of organisational networks.

Rule-Makers vs Change Agents: In the Safety 1 paradigm, safety practitioners are predominantly seen as makers and enforcers of rules, tasked with ensuring adherence to established safety protocols. Safety 2.1 reconceptualises their role as change agents who facilitate adaptation and growth. They are seen as catalysts in a dynamic environment, empowering workers and encouraging innovative solutions to safety challenges.

Limited Best Practices vs Multiple Approaches: Safety 1 prescribes a limited number of 'best' methods for ensuring safe work, often leading to a one-size-fits-all approach. In contrast, Safety 2.1 recognises the uniqueness of each situation and promotes flexibility in approach. It acknowledges a broader spectrum of effective strategies, tailored to specific contexts and challenges.

Hierarchical vs Sapiential Authority: Safety 1 is characterised by a hierarchical approach, emphasising top-down authority and decision-making. Safety 2.1, however, values the competence and wisdom (sapience) of frontline technicians. It appreciates the depth of their experience and insights, encouraging a more collaborative and inclusive approach to safety management.

Objective Risk Assessment vs Unpredictable Risks: In Safety 1, risk is perceived as objectively measurable and quantifiable, suggesting a predictable and controllable environment. Conversely, Safety 2.1 recognises the unpredictable and complex nature of most risks, especially in dynamic and rapidly evolving contexts. It promotes a more nuanced understanding of risk as a multifaceted and often unpredictable phenomenon.

Expert-Created Rules vs Technician-Decided Rules: In the Safety 1 model, rules and protocols are typically defined by experts who may be removed from the day-to-day realities of the operational environment. Safety 2.1, however, advocates for a more bottom-up approach, where technicians with hands-on experience play a crucial role in crafting the guidelines. This approach values the practical wisdom and contextual knowledge of those directly involved in the work.

Increasing Rigidity in Rules vs Enhancing Frontline Competency: Safety 1 often responds to incidents or failures by implementing more rigid rules, potentially leading to an over-regulated environment. Safety 2.1, in contrast, focuses on enhancing the competency and decision-making skills of frontline workers. It emphasises the development of their ability to respond to unexpected situations, thereby fostering a more adaptive and resilient safety culture.

Valuing Consistency vs Emphasising Resilience: In Safety 1, consistency is key, often pursued through rigorous document control and strict adherence to protocols. Safety 2.1, however, places greater emphasis on resilience and adaptability in changing situations. It recognises the importance of being able to adjust and respond effectively to unforeseen challenges, rather than simply maintaining a static set of practices.

Several further contrasts between Safety 1, Safety 2, and Safety 2.1 are explored in the book, showing how each model interprets performance, error, and adaptation.

Theory and Practice

Safety 2.1 is deeply rooted in a variety of theoretical frameworks, making it inherently complex and dynamic. It is characterised by its adaptability, flexibility and a deliberate move away from prescriptive, one-size-fits-all methods. This paradigm shift represents a significant departure from traditional safety methodologies, embracing a more holistic view of organisational safety. Implementing Safety 2.1 effectively requires a continuous and thoughtful reference to its theoretical underpinnings. These principles, which have been mentioned previously, form the backbone of this approach. Neglecting to apply these theoretical concepts consistently risks regression to the more rigid, conventional Safety 1 methodologies. Safety 2.1 is designed to transcend these traditional approaches, offering a more nuanced and responsive way of managing safety that aligns with the complexities of modern organisational environments.

Safety 2.1 strives to add to the Safety 2 framework by specifically focusing on the operationalisation of the key constructs, bridging the gap between these theoretical foundations and their practical application in the field of safety management. While the focus in the following chapters will be on a pivotal aspect of safety management systems – the management of hazards and risks – it is crucial to emphasise that this text is not intended to serve as a step-by-step manual for executing safety-management strategies. Instead, it aims to provide a conceptual framework of guiding principles that can inform and shape practical safety-management approaches. This perspective acknowledges the varied and often unpredictable nature of organisational environments, where rigid procedures may not always be applicable or effective. By

understanding and applying the core concepts of Safety 2.1, safety practitioners and organisational leaders can develop more adaptable, resilient and contextually relevant safety strategies. These strategies, while guided by theory, must be tailored to the unique characteristics and needs of each organisation, allowing for a more organic and effective integration of safety into the fabric of organisational life.

This exploration will not only highlight the implementation processes but also the challenges and learning opportunities encountered in implementing Safety 2.1. This aims to equip readers with the insights and tools necessary to navigate the complexities of modern safety management, fostering an environment where safety is not just a compliance requirement but an integral part of organisational culture and performance.