

Organisational Culture: Reviewed and Repositioned

Core Body of Knowledge for the
Generalist OHS Professional

Second Edition, 2019

10.2.2



AIHS

Australian Institute
of Health & Safety



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Acknowledgements



The Australian Institute of Health & Safety (AIHS) financially and materially supports the *OHS Body of Knowledge* as a key requirement of the profession.

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(www.ohseducationaccreditation.org.au)

Bibliography

ISBN 978-0-9808743-2-7

First published in 2019

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This is a companion chapter to *OHS BoK 10.2.1 Organisational Culture: A Search for Meaning*. Readers interested in the literature and research on organisational culture prior to 2014 may find it useful to read that chapter as background.

Citation of the whole *OHS Body of Knowledge* should be as:

AIHS (Australian Institute of Health & Safety). (2019). *The Core Body of Knowledge for Generalist OHS Professionals*. Tullamarine, VIC: Australian Institute of Health & Safety.

Citation of this chapter should be as:

Borys, D. (2020). Organisational culture: Reviewed and repositioned. In *The Core Body of Knowledge for Generalist OHS Professionals*. Tullamarine, VIC: Australian Institute of Health & Safety.



Organisational Culture: Reviewed and Repositioned

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Organisational Culture: Reviewed and Repositioned

Abstract

The construct of 'safety culture' remains alive and well in industry and among researchers. However, research evidence linking safety culture with better occupational health and safety (OHS) outcomes is weak. While industry may not talk about 'safety climate,' the research findings linking safety climate with better OHS outcomes is strong. Therefore, OHS professionals should emphasise safety climate over safety culture. Specifically, OHS professionals should adopt an intervention evaluation process using safety climate to measure the effectiveness of interventions. Safety climate measures may also be used to target interventions in the first instance. A significant gap is identified between research and practice, and the research findings may not always reflect industry experience. This companion chapter to *OHS Body of Knowledge* 10.2.1 Organisational Culture: A Search for Meaning draws on a range of information sources, including a review of the post-2014 research evidence base and focused discussions with OHS professionals and organisational psychologists. Ultimately, it will be the law and workers who will judge whether an organisation's efforts to create a healthy and safe working environment have been effective.

Keywords

Organisational culture, safety culture, safety climate, OHS

Contextual reading

For a full list of chapters and a synopsis of the *OHS Body of Knowledge*, readers should refer to 1 Preliminaries. Chapter 2, Introduction, describes the background and development process while Chapter 3, The OHS Professional, provides context by describing the role and professional environment.

Terminology

Depending on the jurisdiction and the organisation, terminology refers to 'Occupational Health and Safety' (OHS), 'Occupational Safety and Health (OSH) or 'Work Health and Safety' (WHS). In line with international practice, this publication uses OHS with the exception of specific reference to the Work Health and Safety (WHS) Act and related legislation.

Jurisdictional application

This chapter includes reference to Australian health and safety legislation. This is in line with the Australian national application of the *OHS Body of Knowledge*. Readers working in other legal jurisdictions should consider these references as examples and refer to the relevant legislation in their jurisdiction of operation.

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1 Introduction

It has been 20 years since Professor Andrew Hale published his *Safety Science* editorial – “Culture’s confusions” – in which he identified several issues related to the concept of safety culture, including whether such a thing even existed (Hale, 2000). Five years ago, the then Safety Institute of Australia (SIA) tackled ‘culture’s confusions’ in the *OHS Body of Knowledge (OHS BoK)* chapter Organisational Culture.¹ The conclusion to that chapter bears repeating here:

The literature review revealed that there is no agreed definition of the term ‘safety culture,’ and no definitive model of safety culture. In short, the body of literature is large, diverse, fragmented, confusing and ambiguous. There is little evidence supporting a relationship between safety culture and safety performance. In a practical sense, it is fruitless to continue to attempt to define safety culture. Rather than trying to change something as nebulous as ‘safety culture,’ the focus should shift to changing the organisational and management practices that have an immediate and direct impact on workplace safety. (pp. 29-30)

In the 14-year gap between Hale’s editorial and the first *OHS BoK* chapter on Organisational Culture little had changed; safety culture was just as confusing in 2014 as it was in 2000. (See Appendix 1 for an excerpt from the 2014 Organisational Culture chapter that provides an analysis of its evidence base.) The aim of this chapter is to consider what, if anything, has changed in the five years between 2014 and 2019. Also, the Australian Institute of Health & Safety (AIHS) has an interest in exploring four questions:

1. What are the drivers/determinants of organisational culture?
2. What is the relationship (if any) between organisational culture and OHS outcomes?
3. How do OHS professionals influence organisational culture?
4. What is the role or implications of organisational culture in creating and managing change?

To address the chapter aim and explore the AIHS questions, research for this chapter included the following information sources:

- The Safesearch *Workplace Health, Safety and Environment Employment Report 2019*, which included an assessment of industry needs relevant to safety culture
- A review of the post-2014 safety culture and safety climate evidence base (Appendix 2)

¹ Republished in 2019 as a companion to this chapter and titled *OHS BoK 10.2.1 Organisational Culture: A Search for Meaning*.

- Content analysis of the descriptions of 50 'health and safety' jobs on *seek.com.au*
- A Google search for 'safety culture'
- Focused discussions with five OHS professionals (Appendix 3)
- A meeting with three organisational psychologists (Appendix 4).

1.1 Definitions

The first *OHS Body of Knowledge* Organisational Culture chapter concluded that we should stop trying to define 'safety culture.' This view carries over to this companion chapter, with the suggestion that the focus should shift to *organisational culture* and its impact on OHS outcomes. The definition of organisational culture used in this chapter is "the way we do things around here."² However, this definition is not without controversy and is viewed by some researchers as too broad.

In comparison, an accepted definition of *organisational climate* is:

... the shared perceptions of and the meaning attached to the policies, practices, and procedures employees experience and the behaviors they observe getting rewarded and that are supported and expected (Schneider, Ehrhart & Macey, 2013, p. 362).

Organisational climate, and safety climate for that matter, are concerned with perceptions of organisational systems, and inclusion of the word 'meaning' in the definition is a nod to the culture that emerges from these perceptions.

Returning to the definition of organisational culture that will be used in this chapter, two things are worth noting. Firstly, the word 'we' indicates that culture is a group phenomenon. There are many groups in organisations and each of these may have their own culture that overlaps to a greater or lesser extent with other groups, but sufficiently for the organisation to fulfill its goals. Secondly, the word 'do' brings a degree of practicality to bear and provides direction to managers and workers as to what they need to do, collectively, to achieve good OHS outcomes.

Combining the words 'we' and 'do' is consistent with Schneider et al.'s (2013) definition of organisational climate reproduced above. For example, consideration of 'we', the workers, raises questions about how workers perceive what the organisation is doing (policies,

² As explained in *OHS Bok* 10.2.1 Organisational Culture: A Search for Meaning, this is Bower's (1966) behaviour-based philosophy as applied by Deal and Kennedy (1982); it is arguably the most widely known definition of organisational culture.

practices, procedures) and the meaning they attach to what the organisation is doing. Consequently, it is argued that the two definitions are compatible.

Also, it is relevant that WHS/OHS Acts contain clear statements about a duty to provide a healthy and safe working environment. Looking after the health and safety of workers is the law, not an option. Therefore, it could be argued that a focus on safety culture is made redundant by the law. If nothing else, this is something to think about.

2 Research versus practice

There is arguably a gap between the research outcomes associated with safety culture/climate and how safety culture/climate is understood and discussed within industry.

Within industry, reference is made almost exclusively to 'safety culture' rather than 'safety climate.' As stated by Schneider et al. (2013, p. 378), "Executives have little concern for the distinctions we have made between culture and climate. Indeed, culture is their commonly used term." The irony, however, is that many safety culture surveys are actually safety climate surveys.

As an example, in the wake of the 2005 BP Texas City catastrophe, the independent panel widely known as the Baker Committee conducted a review of BP's "safety culture." The ensuing report...includes the item content of a "safety culture survey" prepared by an independent consulting firm. This survey is a clear example of a safety climate survey with its focus on policies, practices and procedures, and behaviors that (fail to) get rewarded, supported, and expected. The panel calls this a culture survey because they implicitly understand that (a) executive interest in "corporate culture" is in creating processes that are reinforcing of the core values underlying existing strategy, (b) a focused strategy requires processes that are focused on valued outcomes (such as safety), and (c) only by the creation of such processes do values actually get embedded (Schneider et al. 2013, p. 378).

The focus on safety culture in industry is at odds with the evidence base. While evidence for a relationship between safety climate and OHS outcomes is strong, the same is not true for safety culture.

Importantly, "Organizational climate and culture [and by extension, safety culture and climate] offer overlapping perspectives for understanding the kinds of integrative experiences people have in work settings" (Schneider et al., 2013, p. 380). While both

culture and climate may be important, from the perspective of the post-2014 evidence base (Appendix 2), safety climate is the more important construct.

With respect to organisational culture and climate, Schneider, González-Romá, Ostroff and West (2017) argued that:

Perhaps the greatest research challenge is to address the long-standing artificial divide between culture and climate theory and research. Climate and culture are metaphors we use to describe the complex social systems that are organizations. There are no clearly demarcated components called climate and culture. Rather they are perspectives on the same entity—the complex system that is an organization—the whole elephant. (p. 477)

This may present not only a research challenge, but also a practical one. The statement above is equally applicable to industry and how it refers to and understands, not only the role of safety culture, but also safety climate. The key to understanding this challenge is embedded in the word ‘metaphors.’ Neither safety culture nor safety climate are ‘things’ that can be done to an organisation. Rather, they are ways of thinking about, talking about and understanding the complexity of work and the social systems at work within which risk exists.

For some organisations, however, safety culture may be an anathema. Such organisations may not see value in focusing on safety culture at all, while others may build their entire approach to improving OHS outcomes on safety culture – and with good results. For other organisations, ‘safety’ may be uncoupled from ‘culture’ so that culture becomes the overriding construct guiding organisational values.

It appears that not only is there a research-practice gap, but also an organisation-to-organisation gap and perhaps even an OHS-professional-to-OHS-professional gap. There is also a researcher-to-researcher gap. While some researchers focus on safety climate (to good effect), others focus on safety culture (to not-so-good effect). Other researchers are comfortable using the two terms interchangeably. Right or wrong, this is the way it is.

Finally, it is worth reflecting on a closing remark from Schneider et al. (2013) in relation to building a relationship with executives:

...the most successful executives implicitly understand how climate and culture are necessarily linked and the complex steps required for achieving competitive advantage. When the culture sought is unique, when the climates created are unique in their complex simultaneous focus on important internal organizational processes (e.g., fairness, ethics, inclusion) and strategic outcomes (e.g., service, safety,

innovation), then competitive advantage is possible. A silver bullet still does not exist, and the best executives know and understand this truth. (p. 380)

Consideration of differences in research and practice – along with the definitional issues and duty under law mentioned in section 1 – should be kept in mind while reading this chapter.

3 Industry needs

According to the Safesearch *Workplace Health, Safety and Environment Employment Report 2019*, OHS professionals perceived their ‘biggest workplace challenge’ to involve ‘safety culture’ and ‘organisational change.’ Safesearch (2019, p. 5) asserted that “The emphasis is now very much on creating a strong, proactive safety culture that is embedded into day-to-day operations,” and presented ‘safety culture’ as an industry need. However, why industry perceives a need for a ‘safety culture’ is unclear.

Following a loss of trust in financial institutions,³ the Australian HR Institute and Insync conducted a survey of workers (the majority in HR roles) to ascertain if organisational cultural issues were more widespread than the financial sector. The resultant report – *5 Hard Truths About Workplace Culture: A Reality Check and a Pathway Towards Sustainable Business* (AHRI & Insync, 2019) – indicated that:

- 90% said they either agree or strongly agree that their organisation’s culture is critical to the successful execution of strategy
- 95% either agree or strongly agree that CEO and executive leadership behaviours have a significant impact on their organisation’s culture
- 92% either agree or strongly agree that their organisation should make the best use of its human capital, yet only 20% agree or strongly agree that their culture currently reflects this (AHRI & Insync, 2019, p. 2).

These results indirectly support the Safesearch (2019) finding that culture is critical. While potentially the biggest challenge facing OHS professionals is providing advice to organisations on how to improve their safety culture, they must at the same time be cognisant of what that means in the context of the broader organisational culture.

A Google search for ‘safety culture’ revealed the popularity of the concept, and a variety of associated opinions. For example:

- “25 signs you have an awesome safety culture”

³ See the *Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry* (Hayne, 2019).

- “8 steps to a strong safety culture”
- “6 steps to help you build a positive safety culture”
- “How to create a safety culture in 5 steps”
- “3 steps to create a safety culture”

and the list goes on.

Although OHS professionals have a wide range of strategies to choose from when seeking to improve their organisation’s safety culture, the key questions are *Will the strategy work?* and *How will I know?*

To gauge industry interest in improving safety culture, descriptions of the first 50 ‘health and safety jobs’ listed on seek.com.au (accessed 30 September 2019) were reviewed to determine the percentage that mentioned ‘safety culture.’ Of the 50 job descriptions reviewed, 18 (36%) mentioned ‘safety culture’; 32 (64%) did not. As a simple content analysis of a point-in-time snapshot of job postings, this outcome should be interpreted with caution; however, it is interesting to note that it does not necessarily support the Safesearch (2019) finding that safety culture is ‘the biggest challenge.’

Descriptions of the 18 jobs that did mention ‘safety culture’ were broken down by job category according to the framework provided by the International Network of Safety & Health Professional Organizations in the guidance document *The Occupational Health and Safety Professional Capability Framework: A Global Framework for Practice* (INSHPO, 2017). This breakdown revealed that 12 of the 18 mentions of ‘safety culture’ were at the OHS professional level while the remaining six were at the OHS practitioner level, indicating that in this small sample it appeared that OHS professionals were twice as likely to be involved in matters of safety culture as OHS practitioners.

In the descriptions of the 18 jobs that mentioned ‘safety culture,’ the verbs ‘drive’ and ‘create’ were frequently used in association with a ‘strong’ or ‘positive’ safety culture.

This small-scale review of health and safety job descriptions raises at least four questions:

1. Who, within the organisation, writes the job advertisements?
2. Who, within the organisation, approves the job advertisements?
3. What is meant by ‘drive’ and/or ‘create’ a safety culture, and how do OHS professionals articulate what that means at interview?
4. What is meant by a ‘strong’ and/or ‘positive’ safety culture, and how do OHS professionals articulate what that means at interview?

The evidence base is one source OHS professionals could draw on to answer questions 3 and 4.

Absent from the Safesearch (2019) report and the outcomes of the Google search and review of OHS professional job advertisements was any reference to 'safety climate.' This could be due to the way the two constructs – 'safety culture' and 'safety climate' – continue to be used interchangeably.

4 The post-2014 evidence base

A review of post-2014 safety culture/climate research was conducted.⁴ Aspects of the resultant evidence base are summarised in Appendix 2.

As stated in section 1, this chapter was driven in part by four questions of interest to the Australian Institute of Health & Safety (AIHS):

1. What are the drivers/determinants of organisational culture?
2. What is the relationship (if any) between organisational culture and OHS outcomes?
3. How do OHS professionals influence organisational culture?
4. What is the role or implications of organisational culture in creating and managing change?

While a comprehensive review of organisational culture literature was outside the scope of this chapter, Schneider et al.'s (2017) review of the constructs of organisational climate and culture provides insights that may allow the AIHS to answer questions 1, 3 and 4. As cited in section 2, Schneider et al. (2017) identified the artificial nature of the research divide between culture and climate, which are in reality perspectives of "the complex system that is an organization" (p. 477).

From a practical perspective, then, a question that must be asked (and answered) is: *Why is it that in OHS, safety culture and safety climate are treated as 'things' to be managed rather*

⁴ Databases searched included Business Source Complete, PsycINFO, ProQuest, EMBASE and Scopus. Search terms used included combinations of *industrial, method, organisational culture, organisational climate, corporate culture, safety culture, safety climate, safety outcomes, safety performance, safety culture maturity, maturity models, safety culture interventions, intervention, program* and *systematic review*.

than as metaphors for the complex social systems within which work and risk arise?

Answering this question should shift the focus away from worker behaviour and onto the system within which workers work and managers manage.

Returning to the four AIHS questions, an answer to question 2 – What is the relationship (if any) between organisational culture and OHS outcomes? – is provided by Hofmann, Burke and Zohar (2017, p. 381): “There is virtually no research specifically linking broader organizational cultural dimensions to more specific safety culture dimensions and safety outcomes.” In their review of occupational safety research and the contribution of applied psychology to the field, Hofmann et al. (2017) found:

Over the last 25 years, the importance of safety climate has been well established concluding with support for a multilevel model. Within both the training and safety climate literature, the importance of frontline leaders and fellow team members’ behavior on individual worker safety behavior also has been well documented. Integrating literatures beyond the scope of our review suggests a systems view is (perhaps obviously) necessary. Appropriate work design, the availability of resources such as relevant equipment, providing training, and building a strongly reinforcing social climate are all required to effectively manage safety at work. ... Yet, even though the safety literature within applied psychology has been moving in the direction of a broader, more organizational perspective, this research has largely focused on unsafe behavior, accidents, injuries and other similar outcomes. Thus, there still remains a significant gap in viewing the safety space in its totality from a systems perspective. This gap, in particular, was emphasized over a decade ago in the Institute of Medicine (1999) report, which **emphasized that medical errors are caused by faulty systems and processes that lead people to make mistakes or fail to prevent them.** (p. 383) (*Emphasis added.*)

Casey, Griffin, Flatau, Harrison and Neal (2017), a group of Australian researchers, argued that systems theory should be integrated with safety culture and safety climate:

Our capability framework clearly distinguishes between the observable features of safety climate and the more implicit elements of safety culture. The framework places safety climate within the domain of social enabling capital, differentiating it from the organizational and human capitals. Safety climate is therefore conceptualized as perceptions of behavioral norms and espoused values around safety, aggregated at different levels of the organization (e.g., team, department, company)...[W]e integrate safety capability and these enabling capitals with systems theory to explore how safety culture and climate can act as forms of control. (p. 345)

Framing safety as a control problem, Casey et al. (2017) stated that “An accident can only occur if the level of control over a work system reduces to the point of failure” and maintained that “safety culture and climate enable organizations to solve the safety control problem through constraints that shape performance in ways that optimize both productivity and safety goals” (pp. 345, 346). They proposed four control strategies that an organisation can use, in combination, to prevent accidents. The four control strategies (p. 348) and a brief summary of each are:

1. *Defend*: Protect against harm or economic loss in a stable and routine environment. For example, disciplinary practices that aim to eliminate violations and performance variability. Top-down supervisory control. May become overly bureaucratic.

2. *Adapt*: Protect against harm or economic loss in a novel accident scenario. For example, adjusting procedures, practices, technology or strategy to prevent future reoccurrences. Providing workers with the flexibility to return the system to a safe state.
3. *Leverage*: Promote safe production in a stable and routine environment. For example, the removal of barriers or constraints that impede progress which requires effective planning and coordination.
4. *Energize*: Promote safe production in a changing environment. For example, a shared vision for safe production.

This shift of focus from worker behaviour to the organisational systems that influence worker behaviour is welcome (although not new given that this is the basis for Australian OHS legislation). Such clarity, however, has not always been present in the safety culture/climate research literature.

Indeed, Le Coze (2019, p. 228) referred to safety culture as a “highly promoted, advocated and debated, but contentious notion” (p. 221). He identified “two waves of safety culture studies, debates, controversies and positions among authors, one from late 1980s/early 1990s to mid-2000s, another from mid-2000s to nowadays” (p. 221), resulting in four views of safety culture:

1. “rejection or critical view of safety culture”
2. “more neutral, scientific interest for safety”
3. “open-mind about safety culture practical value”
4. “promoting methods, programs and models” (p. 224).

Le Coze (2019) argued that an explanation for these diverse views:

... can be found in the social structuration of the safety field. This field is socially structured by the interactions between academics, consultants, publishers, industries and regulators which create specific dynamics which in turn shape knowledge production, and influence practices. Such knowledge is caught in multiple and potentially competing interests. (p. 228)

A lingering question is whether this social structuration creates conflict between the different groups that may be pulling in different, and possibly opposing, directions in relation to safety culture, perhaps at times out of self-interest.

One theme that emerges from the post-2014 evidence base is ‘interventions’ and their evaluation. (The word ‘intervention’ is underlined where it appears in Appendix 2.) This is indicative of a major change compared with the situation as reported in the 2014 chapter. Also, four method and/or thematic concentrations can be identified (and have been indicated by shading in Appendix 2):

1. Method: systematic reviews

2. Focus: maturity
3. Industry: transport and construction
4. Method: accident case studies.

The focus on maturity, including safety maturity models, also represents a major change since 2014.

The remaining studies in Appendix 2 represent a diverse range of either focus areas, methods and/or results, making interpretation and generalisation of findings difficult. However, three aspects that warrant discussion are explored in the following sections:

- The results of six systematic reviews
- The results of safety culture maturity model studies
- The findings from accident case studies.

4.1 Six systematic reviews

The search of research databases revealed six systematic reviews published since 2014. Three (Aburumman, Newnam & Fildes, 2019; Lee, Huang, Cheung, Chen & Shaw, 2019; Nævestad, Hesjevoll & Phillips, 2018) reviewed safety culture/climate interventions. Two (Kalteh, Mortazavi, Mohammadi & Salesi, 2018; Leitão & Greiner, 2015) reviewed the association between safety climate, safety culture and safety performance. One (Newaz, Davis, Jefferies & Pillay, 2018) was undertaken to develop a safety climate model for the construction industry.

The three safety culture/climate intervention reviews provided conflicting conclusions on the efficacy of interventions. For example, Aburumman et al. (2019) reported “inconclusive” results, Nævestad et al. (2018) found that safety culture interventions in transport “seem to be effective,” and Lee et al. (2019) found that “89.5% of the studies showed a statistically significant improvement in safety climate post-intervention.”

Of the two reviews focusing on the relationship between safety climate/culture and safety performance, Leitão and Greiner (2015) found that:

Although 15 of the 17 studies included in this review provided full or partial support for the association of safety culture with accidents/injuries at work, scientific evidence is still unclear on the causal relationship between these two variables. Research is needed, especially longitudinal and intervention studies, to demonstrate in detail this association... (p. 71)

In their more recent review, Kalteh et al. (2018) found that:

...reactive and proactive measures have a negative and positive relationship with safety climate and safety culture, respectively. Nevertheless, it is difficult to determine the magnitude of such effects due to the use of different assessment tools and the various characteristics of societies and industries. (p. 9)

While Leitão and Greiner (2015) called for more intervention evaluation studies, Kalteh et al. (2018) found this call was yet to be answered, having identified no studies “evaluating the effect of safety interventions on safety performance,” and argued that a reason for this dearth of intervention evaluation research could be because “the effects of changes in safety culture or safety climate can be displayed in the long run” (p. 9). Lee et al. (2019) also identified a lack of safety culture intervention evaluation studies and offered several reasons for this, including:

...difficulty in assessing safety culture (which is at the deeper or even subconscious level) and a lack of empirical understanding of the proper span of time for cultivating intended culture (i.e., there may be a significant time lag between the intervention and cultural change. (p. 71)

Two insights emerge from these systematic reviews: firstly, there is increased interest among researchers in safety culture intervention evaluation studies and OHS performance; and, secondly, the relationship between safety culture and safety climate interventions and safety performance is inconclusive.

4.2 Safety culture maturity model studies

Since 2014, safety culture maturity models have increased in popularity as a means of diagnosing safety culture (Goncalves Filho & Waterson, 2018). Goncalves Filho and Waterson (2018) found that “no firm conclusions can be drawn about the reliability and validity” of using maturity models and that the field remains “immature” (p. 209), and suggested that the “process of using a maturity model may be more important than the outcome” (p. 208).

Two other relevant studies have since contributed to the evidence base – a study of mining in West Africa (Stemn, Bofinger, Cliff & Hassall, 2019) and a study to develop a leadership maturity model for the Australian construction industry (Oswald & Lingard, 2019). Stemn et al. (2019) found that mine sites with lower incidence rates had higher safety culture maturity scores. They maintained that managers and workers found the maturity model framework useful and that it could be used to identify weak spots for future interventions. Oswald and Lingard (2019) identified six sources of important frontline leadership influence in the Australian construction industry:

- A: The foreman and subcontractor supervisor relationship,
- B: The leadership styles of the foreman and supervisor,

- C: The foreman and workers' relationship,
- D: The subcontractor supervisor to supervisor relationship,
- E: The workgroup communication; and,
- F: The relationship between the frontline leaders and the H&S advisors. (p. 677)

Item F in the above list is of particular relevance for OHS professionals. Oswald and Lingard (2019) found that:

The way that H&S advisors behaved and were perceived varied from site to site. In some situations H&S advisors were seen to be supportive and helpful, while in others they were seen to behave as 'policemen' focused on the enforcement of rules, rather than the resolution of problems. In more mature environments, the former approach was prominent. (pp. 682-683)

In his review of safety culture maturity models, Hopkins (2019, p. 32) argued that "diagnosis is one thing; moving companies up the ladder is quite another". He goes on to argue, based on his interpretation of comments by Patrick Hudson, the principal designer of the safety culture ladder, that "culture change requires a change in organisational structure and cannot be achieved by educational programs alone" (p. 33). However, such changes are often resisted by top management "who would rather that the hearts and minds of employees be won over without any fundamental change to the way the organisation does business" (p. 34).

4.3 Accident case studies

Contrary to other inquiries into the causes of major disasters (e.g. the BP Texas City disaster), in *Ten Pathways to Death and Disaster: Learning from Fatal Incidents in Mines and Other High Hazard Workplaces*, Quinlan (2014, p. ix) found "no evidence to support other popular explanations...which focus on behaviour, culture..." In his critique of safety culture and safety climate, Quinlan (2014, p. 30) stated that organisational factors such as the "pressure for profit and production" are either overlooked, deemphasised or disguised by the concept of safety culture, and that "the concepts of safety culture and safety climate entail disembodiment and micro-psychologising workplace health and safety."

Quinlan's (2014) ten pathways to death and disaster did not explicitly mention safety culture or climate:

1. Engineering, design and maintenance flaws;
2. Failure to heed warning signs;
3. Flaws in risk assessment;
4. Flaws in management systems;
5. Flaws in auditing systems;
6. Economic or reward pressures compromising safety;
7. Failures in regulatory oversight;
8. Worker or supervisor concerns that were ignored;

9. Poor workers management communication and trust;
10. Flaws in emergency and rescue operations. (p. ix)

in his review of Quinlan's book, Hopkins (2015) found this absence telling:

One of the interesting aspects of Quinlan's list is that **it does not include 'defective safety culture' as one of the pattern causes**. This is worthy of some comment. It is fashionable to identify a defective safety culture as the root cause of accidents. Those who use the term often assume that the way to tackle this problem is to change the way workers think about safety, by winning their hearts and minds. But this is bound to fail, unless organisations themselves change the way they do business. There is a good reason for saying this. **The culture of the workplace is largely a reflection of what leadership wants or tolerates**. It will only give greater emphasis to the control of catastrophic risk if leaders pay systematic attention to the way such risk is managed, and if they reward relevant behaviour, for example, the reporting of near misses and warning signs. **Culture is better seen not as an explanation but as a description**. It is 'the way things are done around here', and the way things are done around here is largely determined by top leadership. For good reason, then, defective safety culture is not on Quinlan's list. (p. 497) (*Emphasis added.*)

Hopkins developed these cultural themes further in *Organising for Safety: How Structure Creates Culture* (2019). Like Quinlan (2014), Hopkins used investigations into major disasters to draw out recurring themes. He argued that structure creates culture, and that the line of report for the risk management function should be direct to the Chief Executive Officer. This line of report is a structural issue and under the control of top management. According to Hopkins (2019), such a structure makes it more likely that bad news will reach the top of the organisation through bad news reporting systems that can provide early warning signs of imminent danger.

Despite the ongoing lack of agreement on how to define 'safety culture' in industry and academia, Hopkins (2019) promoted the definition of culture as *the way we do things around here* (a culture that emphasises safety) as being practical, concrete and sufficient. Practical and concrete in so much that 'we' emphasises the group nature of culture and 'do' as in the leadership practices, organisational structures, organisational practices and management systems that an organisation has in place to manage OHS risks. He advocated for culture to be thought of as a description (*the way we do things around here*) rather than as an explanation (culture as a cause).

One limitation of these accident case studies is that they draw their lessons (appropriately) from low-probability, high-consequence events. The extent to which these lessons apply to higher-probability, lower-consequence OHS risks is debatable. Given, however, that both Quinlan and Hopkins' lessons emphasise the importance of organisational and system level factors, it is likely that they apply to all types of risks.

4.4 Summary of results

Based on the review of the evidence base, Table 1 summarises ‘what we know’ and ‘what we don’t know’ about safety culture and safety climate. It is evident that ‘culture’s confusions’ (Hale, 2000) remain as valid today as they were 20 years ago.

Table 1: Summary of ‘what we know’ and ‘what we don’t know’ about safety culture and safety climate as a result of a review of the post-2014 evidence base

What we know	What we don’t know
<ol style="list-style-type: none">1. How to define safety climate2. Evidence for safety culture interventions is inconclusive3. Roles of the group and supervisors are important4. There is no demonstrated relationship between organisational culture, safety culture and safety outcomes5. Safety climate surveys can predict unsafe behaviours and safety outcomes	<ol style="list-style-type: none">1. How to define safety culture2. How to evaluate safety culture interventions3. The difference between safety climate and safety culture4. How to change safety culture5. What theory of safety culture works best6. How to consistently measure safety culture and safety climate7. Whether safety culture maturity models improve health and safety outcomes8. The broader role of organisational systems in worker behaviour and health and safety outcomes

In summary, while there is good evidence of a relationship between safety climate and OHS outcomes, the same is not true for safety culture.

5 An evidence-informed statement

The purpose of the *OHS Body of Knowledge* is to synthesise, and provide OHS professionals with, the best available research evidence for managing OHS. Therefore, in relation to safety culture and safety climate, the following statement applies:

There is strong evidence for a relationship between safety climate and OHS outcomes. There is weak evidence for a relationship between safety culture and OHS outcomes. Therefore, based on the research evidence, OHS professionals should emphasise safety climate over safety culture.

6 Industry needs versus the evidence base

Considering ‘what we know’ and ‘what we don’t know’ about safety culture based on the post-2014 evidence base (Table 1), the evidence-informed statement and industry’s perceived need for “a strong, proactive safety culture that is embedded into the day-to-day operations” (Safesearch, 2019, p. 5), it is clear that a gap exists (Figure 1). In short, the evidence base does not offer industry much help in terms of fulfilling its need. This could be an example of Le Coze’s (2019) social structuration playing out in practice. This places OHS professionals in a precarious position when it comes to advising organisations on how to improve safety culture and makes it difficult for them to answer questions about whether the chosen strategy will work and how they will know.

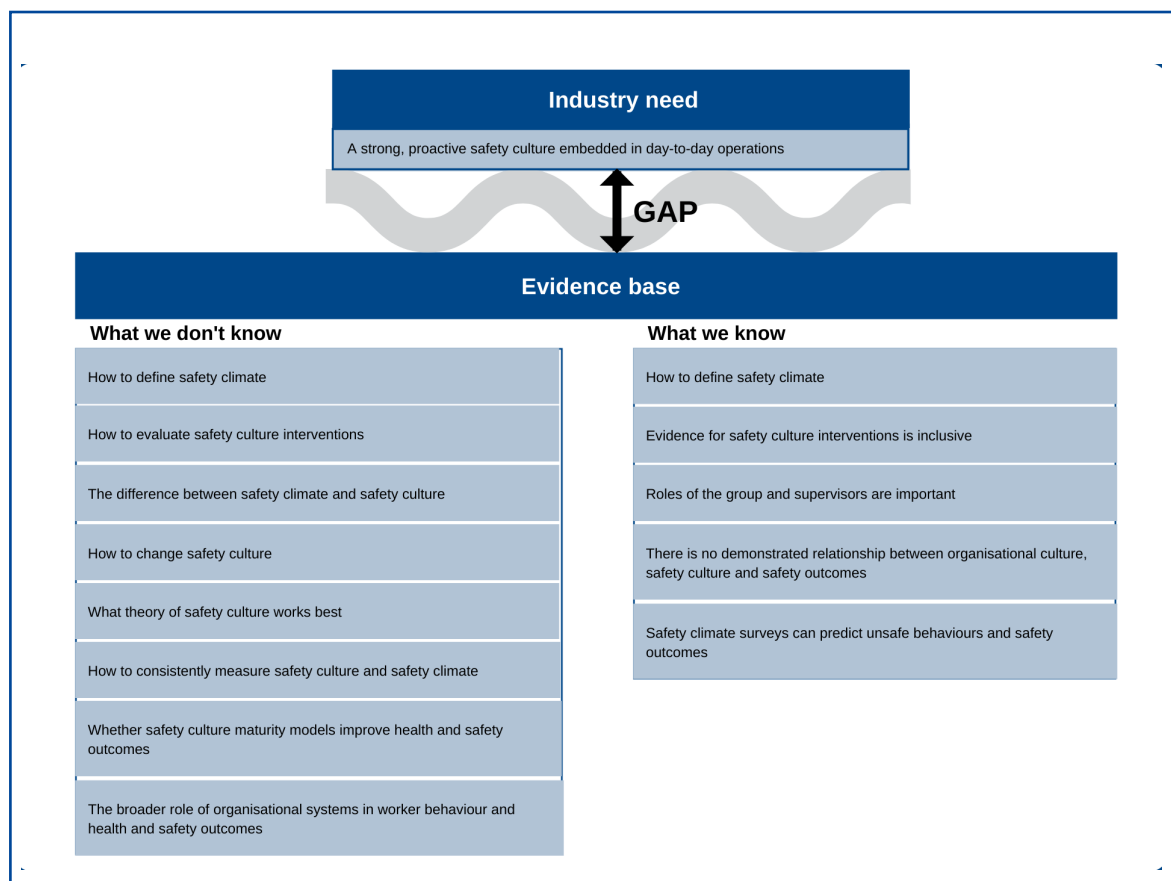


Figure 1: The gap between industry need and the evidence base

7 Research-to-practice and practice-to-research gaps

While the previous section juxtaposed industry needs with the post-2014 evidence base, this section considers two findings from the focused discussions held with OHS professionals.

Firstly, the OHS professionals' views on the importance of safety culture ranged from 'important' to 'not important.' This suggests that, in practice, whether an organisation focuses on safety culture may depend on the worldview of individual OHS professionals rather than (or as well as) on the OHS profession as a whole. This raises questions about the sources of OHS professionals' information on safety culture – industry, research, conferences, consultants etc. – and the possible implications.

Secondly, there appears to be a gap between research and practice. While the literature on the effectiveness of safety culture for improving OHS outcomes is inconclusive, individual organisations may have evidence for how a focus on safety culture is improving OHS outcomes. Industry evidence, which may influence the worldviews of individual OHS professionals, is rarely reflected in the research literature. (Appendix 3)

These findings support the assertion that along with the gap between translating safety culture research to practice, a gap exists between safety culture practice and research. The difficulties of translating OHS research to practice and OHS practice to research are well known (Choi & Borchardt, 2016; Dugan & Punnett, 2017; Lucas, Kincl, Bovbjerg & Lincoln, 2014; van Dijk, Verbeek, Hoving & Hulshof, 2010; Van Eerd, 2019; Schulte et al., 2017). Van Dijk et al. (2010, p.1262) argued that OHS professionals “should use scientific evidence to support their decisions in policy and practice.” When the research is inconclusive, however, it does not help OHS professionals in their decision making. Further, closing the research-to-practice and practice-to-research gaps (abbreviated to RtPtR by Choi & Borchardt, 2016) does not receive much attention in OHS (Schulte et al., 2017), and the translation of research to practice is slow and incomplete (Dugan & Punnett, 2017). This is particularly true, it would seem, for safety culture.

The RtPtR gaps in relation to safety culture need to be bridged by researchers, OHS professionals and organisations. While the research findings are sometimes positive, frequently they are inconclusive. Industry practices in relation to safety culture vary between industries and within the OHS profession and may or may not take account of research findings. Closing these gaps is imperative and may be best achieved through better communication between researchers and OHS professionals. In the meantime, OHS professionals are left with a dilemma in relation to the implications for practice: focus on safety culture because that is what industry needs and wants or abandon safety culture on the basis of inconclusive research findings? Finding a middle ground may involve changing

the language to a 'culture of safety' and focusing organisational effort on intervention; these are discussed in sections 8 and 9, respectively.

8 From 'safety culture' to 'culture of safety'

For 40 years (in the case of safety climate) and more than 30 years (in the case of safety culture), researchers, managers and OHS professionals have been searching for that elusive [insert: positive, mature, strong, proactive, awesome, excellent, effective, hidden] 'safety culture' as the answer to OHS problems. Based on the evidence to date, this search has been largely unsuccessful. One conclusion that can be drawn is that 'safety culture' is a myth. A myth in this context is defined as "a popular belief or tradition that has grown up around something...an unfounded or false notion."⁵ Safety culture qualifies as a myth because it has become a popular belief that appears to be an unfounded, false notion.

Now may be the time to gently cast aside the construct of 'safety culture.' Given, however, that 'safety culture' is so deeply rooted in the OHS lexicon, this call may be met with resistance. A compromise may be to follow in the footsteps of the healthcare industry and replace 'safety culture' with 'culture of safety,' defined as *the way we do things around here*. Healthcare has focused, and continues to focus, on intervention evaluation to improve patient safety outcomes (e.g. Cropper et al., 2018; De Brún, O'Donovan & McAuliffe, 2019; Sekhon, Cartwright & Francis, 2017). The impetus for this focus was the Institute of Medicine report *To Err is Human: Building a Safer Health System* (Kohn, Corrigan & Donaldson, 2000, p. xvi), which called on the industry to develop a "culture of safety." While OHS does not attract the same level of government or societal interest as healthcare, OHS has a lot to learn from the healthcare industry's approach to culture change and intervention evaluation.

A caveat is warranted here. Safety climate as a measure of workers' perceptions of an organisation's commitment to safety, measured at a single point in time, is less likely to be a myth based on the evidence. Unfortunately, while a relationship has been established between safety climate, safe behaviour and injury rates, there is less evidence for organisational factors that influence worker behaviour as noted by Hofmann, Burke & Zohar (2017).

⁵ Merriam-Webster Dictionary (2018). Retrieved 10 September 2019 from <https://www.merriam-webster.com/>.

9 Intervention evaluation

'Interventions' emerged as theme in the review of the post-2014 safety culture/climate evidence base (Appendix 2). The previous section advocated use of a 'culture of safety' in preference to 'safety culture.' A 'culture of safety' is one that drives interventions and their evaluation. Drawing on the learnings from the accident case studies (Hopkins, 2019), an organisation with a 'culture of safety' improves OHS outcomes via:

1. Leadership practices
2. Organisational structure
3. Organisational practices
4. Management systems.

Interventions, by their very nature, involve a change process. The OHS professional is in the best position to lead this change process by working in consultation with workers and managers to identify, implement and evaluate interventions appropriate to the organisation and its risks. If this change process is a success, then there will be a diminishing need to talk about culture.

For the OHS professional, an intervention (change) may be framed as a thought: "I have an idea for improving OHS outcomes." Interventions (ideas) may be:

- Local and specific to a particular workplace or workgroup, for example:
 - A new method for eliminating or controlling risk
 - A redesign of the system of work
 - A change to safety rules
 - An education program.
- Global in that they apply to all workplaces and all workgroups within the organisation, for example:
 - A change to a management system (e.g. hazard identification and risk control, reporting, rewards and incentives)
 - A change to safety rules (e.g. all employees must ...)
 - A new education program (e.g. mental health awareness).

Intervention evaluation is not new to the OHS field. Two decades ago, Goldenhar et al. (2001) proposed a conceptual model for intervention evaluation research, stating "The goal of occupational safety and health intervention effectiveness research is to determine whether specific interventions work to prevent work-related injury and illness" (p. 616) or, put more bluntly, "Does it work?" (p. 621).

While intervention evaluation studies have been largely the domain of researchers, Nielsen and Abildgaard (2013, p. 292) argued that an intervention evaluation framework “with some adaptation to the individual situation, can be used by managers, HR and occupational health practitioners and that it will raise awareness of how self-initiated organizational interventions may be evaluated.” OHS professionals should be added to this list. Nielsen and Abildgaard (2013, p. 292) indicated that analyzing “the mental models of all actors in the intervention,” or how the actors jointly make sense of and see benefit in the intervention, is one method of evaluating the intervention. This method differs significantly from the use of safety climate surveys, which focus more on worker compliance and behaviour and may miss key organisational (system) factors that influence how workers work. One way forward is to write survey and focus group questions designed to gain workers perceptions on the effectiveness of the intervention.

Figure 2 is a systems-based framework that may assist OHS professionals to think about and plan an intervention-evaluation process. It should be noted that more specific frameworks are available (e.g. Goldenhar et al., 2001; Nielsen & Abildgaard, 2013). Figure 2 should be read in conjunction with *OHS Body of Knowledge* chapter 38, Model of OHS Practice.

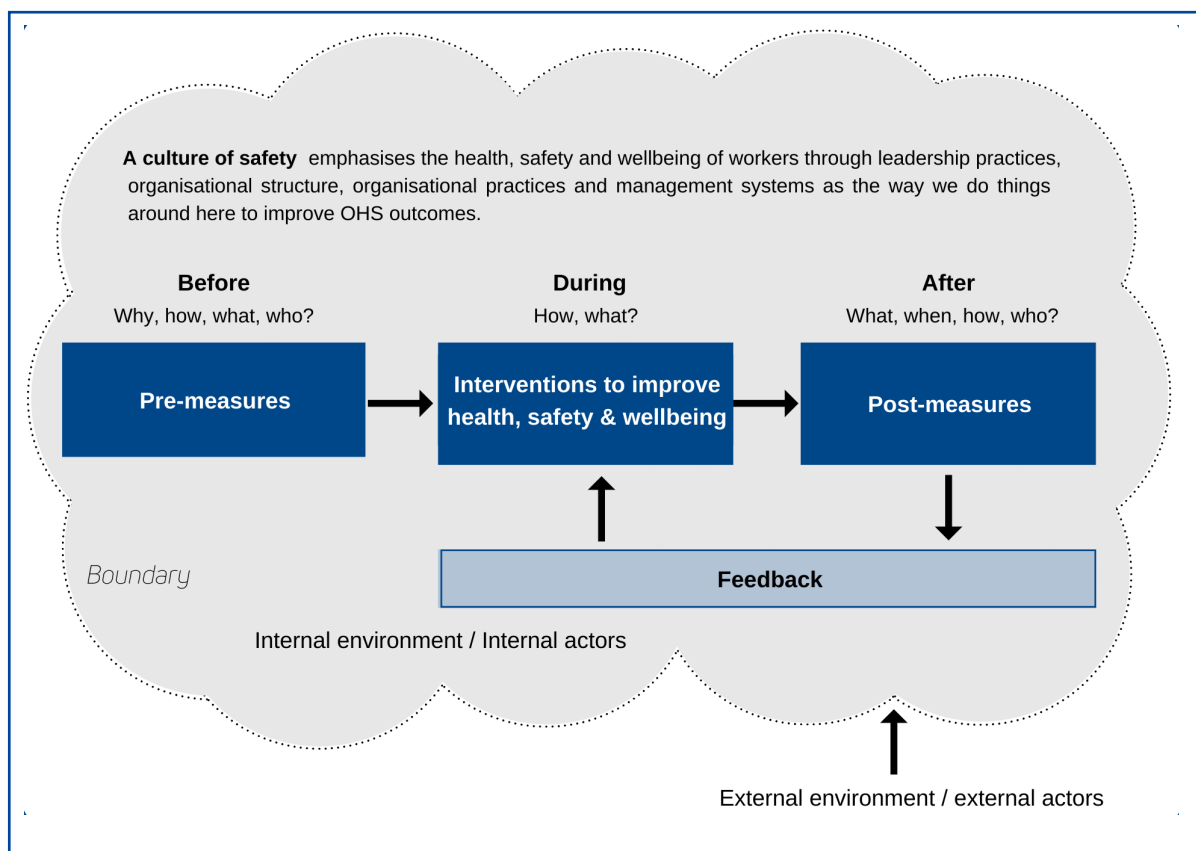


Figure 2: A systems-based framework for thinking about and planning an intervention evaluation

Figure 2 shows high-level relationships between the parts of an organisation as a system that may influence whether an intervention is effective in the short or long term. Internal-environment actors who may influence the intervention process include workers, supervisors, OHS professionals, engineers and managers. External-environment actors who may influence the intervention process include regulators, managers within the same industry, managers in other industries and shareholders. In simple terms, intervention evaluation is a three-stage process:

1: Before

Key questions may include:

- Why is the intervention being proposed (problem)?
- Why this intervention and not others (justification)?
- How will we intervene (process)?
- What should be measured prior to intervening (sensemaking, practices)?
- Who should be involved (workers, supervisors, engineers, managers, OHS professionals)?
- What resources will be required (people, time, money)?

2: During

Key questions may include:

- How is it going (sensemaking check)?
- Who do we gain feedback from (particularly from workers)?
- What do we need to adjust based on the feedback (continuous improvement)?

3: After

Key questions may include:

- What should be measured after the intervention (sensemaking, practices)?
- When should we measure (timing)?
- How often should we measure (timing over time)?
- Who should be involved (workers, supervisors, engineers, managers, OHS professionals)?

The success of the intervention process will depend on leadership practices and sustained organisational practices in support of the intervention. If the intervention is a success – that is, if it works, particularly from the workers' perspective – then the culture of safety within the organisation will evolve. Workers will learn to trust managers and therefore may be more willing to support future interventions. However, if organisational support for the intervention wanes, the culture of the organisation will continue to evolve, but possibly away from the desired culture of safety towards a culture of mistrust in which workers may withdraw their support for future interventions or view future intervention attempts with cynicism. In simple terms, if the intervention works, then the need to talk about a 'culture of safety' or 'culture' diminishes. In other words, get it right and let culture take care of itself.

10 Implications for OHS practice

This chapter's information sources (section 1) provided some conflicting evidence regarding the effectiveness of safety culture for improving OHS outcomes. Implications for OHS practice are considered in Table 2.

Table 2: Implications for OHS practice

	Aspects	Impacts
1. Safesearch <i>Workplace Health, Safety and Environment Employment Report 2019</i>	The biggest workplace challenge facing OHS professionals is safety culture and organisational change. "The emphasis is now very much on creating a strong, proactive safety culture that is embedded into day-to-day operations."	The OHS professional, when applying for a new job, should be prepared to respond to the question: <i>How would you drive a positive safety culture?</i>
2. Content analysis of 50 'health and safety' jobs on seek.com.au	Of the 50 jobs reviewed, 18 (36%) mentioned 'safety culture.'	The OHS professional, when applying for a new job, may need to be prepared to respond to the question: <i>How would you drive a positive safety culture?</i>
3. Google search for 'safety culture'	There are a variety of views and opinions on safety culture, e.g. <i>6 steps to help you build a positive safety culture.</i>	The OHS professional should ask consultants for evidence that their program for improving safety culture works.
4. Review of the post-2014 safety culture/climate evidence base (Appendix 2)	Although some individual studies were positive, overall results were at best inconclusive and at worst indicative of safety culture as 'not important.'	The OHS professional has three options: 1. Stop worrying about safety culture as it is not important 2. Stop worrying about safety culture and focus on intervention evaluation 3. Ignore the results.
5. Two focused discussions, each with two OHS professionals (Appendix 3)	Views on safety culture ranged from 'not important' to 'important,' and revealed RtPtR gaps.	The OHS professional has four options: 1. Continue promoting safety culture in their organisation 2. Stop worrying about safety culture as it is not important 3. Publish and present evidence that their organisation's approach to safety culture works 4. Communicate their experiences with safety culture, good and bad, with researchers.
6. Meeting with three organisational	Safety climate should be emphasised over safety culture	The OHS professional should: 1. Emphasise safety climate

psychologists (Appendix 4)		<p>over safety culture in their discussions with managers</p> <ol style="list-style-type: none"> 2. Know the limits of their capability and when to call in an expert, e.g. an organisational psychologist 3. Use simple safety climate measures
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11 Conclusion

The aim of this companion chapter to *OHS Body of Knowledge* 10.2.1 Organisational Culture: A Search for Meaning (2019) was to assess relevant changes since the 2014 publication of the first Organisational Culture chapter. It is concluded that there is now strong evidence for a relationship between ‘safety climate’ and OHS outcomes. Therefore, OHS professionals should emphasise safety climate over safety culture.

What has not changed since 2014 is that there remains weak evidence in support of ‘safety culture’ as a means of improving OHS outcomes. Safety culture is associated with as much confusion now as it was when Hale (2000) wrote his editorial. It is suggested that the construct of safety culture is a myth, and that it is preferable to refer to a ‘culture of safety’ defined as *the way we do things around here*. This definition relies on leadership practices, organisational structure, organisational practices and management systems to improve OHS outcomes. Workers are in the best position to judge if *the way we do things around here* is working.

What has changed is that use of safety culture maturity models to diagnose an organisation’s safety culture has increased in popularity. This is mirrored by increased researcher interest in the effectiveness of safety culture maturity models for improving safety performance, however a link is yet to be demonstrated.

Another change is increased research interest in the link between safety culture interventions and safety performance. Despite the popularity of safety culture interventions in industry, no conclusive link has been found.

While there is some industry evidence that a focus on safety culture does improve OHS outcomes, it appears that OHS professionals may be divided in their opinions of the

usefulness of the safety culture construct. Taken together, industry needs, the evidence base and results of the focused discussions suggest a two-way gap exists between research and practice.

Finally, for OHS professionals, focusing on intervention evaluation as a means of improving OHS outcomes may diminish the need to talk about culture. If the interventions improve the conditions under which workers work, and workers perceive those interventions as meaningful as measured by a simple climate survey, that is all that is needed.

12 Summary

The research evidence shows a strong relationship between safety climate and OHS outcomes and a weak relationship between safety culture and OHS outcomes. Therefore, OHS professionals should emphasise safety climate over safety culture. The views of OHS professionals (and, potentially, of the organisations they advise) on safety culture may range from 'not important' to 'important.' Conflicting views on the usefulness of the safety culture construct exist both within research and the OHS profession, and between researchers and OHS professionals. The same is not true for safety climate. This situation highlights a need to close the research-to-practice gap. While the implications of this conflict for OHS practice are many, OHS professionals may be best served by focusing on intervention evaluation, safety climate as a tool for measuring the effectiveness of interventions, developing organisational structures and practices for delivering successful interventions, and remembering all the while that safety climate and safety culture are but metaphors for understanding the same thing – how to create a healthy and safe working environment as the law requires.

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Appendix 1: Excerpt from *OHS Body of Knowledge* 10.2.1 Organisational Culture: A Search for Meaning

Since the 1986 Chernobyl nuclear disaster brought the ‘safety culture’ to the fore as an avenue to explore for improving safety performance, there has been an explosion of academic and organisational interest in the construct. Although unresolved debates and definitional issues surround the concept of safety culture, organisations continue to cling to the idea of safety culture as a panacea for their safety problems. Consequently, the concept of safety culture is reified and normalised, eschewing a richer understanding of organisational culture. In the process, attention is diverted from the issues of power, conflict, meaning, symbols, diversity and contradiction that make up the rich tapestry of organisational life and culture (Antonsen, 2009c; Dekker & Nyce, 2014; Silbey, 2009). Understanding organisations as cultures widens the frame of interest for thinking about improving workplace safety. Therefore, continuing to debate and pursue safety culture as a ‘thing’ to improve safety is fruitless. Workplace safety may be better served by shifting attention and discourse from changing safety culture to changing organisational and management practices that have an immediate and direct impact on risk control in the workplace. Such an approach avoids reifying and normalising safety culture either as a ‘thing’ to be managed or as something that is good or bad.

Changing organisational and management practices is consistent with the popular definition of safety culture as “the way we do things around here.” If this definition is expanded to “the ways we understand things are and ought to be done around here” (Myers et al., 2014, p. 27), then the organisational and management practices that focus on safety (the way we do things around here) are a reflection of the culture of the organisation and the systems of meanings that guide behaviour (the ways we understand things are). Proposed changes to organisational and management practices that focus on safety should be understood in the context of the wider organisational culture, with organisational culture rather than safety culture becoming the primary concept of interest (Hopkins, this chapter), thus avoiding the debate and confusion over safety culture and its definition.

Organisational culture, or thinking culturally about organisations (Alvesson, 2013), should be understood as a metaphor rather than a variable. Such an approach allows the culture of the organisation to be described, and such descriptions will help organisations frame and shape changes to organisational and management practices designed to improve workplace safety. Reconceptualising culture in this way is consistent with a theme in the literature that distinguishes between what culture *is* and, importantly, is *not* (Dekker et al., 2014; Hale, 2000). Alvesson (2013, p. 6) distinguished between culture and social structure: “Culture describes social action as depending on the meaning it has for those involved, while social structure describes social action from the point of view of its consequences on the

functioning of the social system.” The broader concept of culture then is fruitful when it comes to implementing management practices designed to improve safety.

All organisations have a culture that will affect and be affected by management practices designed to improve safety. Conceptualising the relationship between culture, management practices and safety in this way shifts the focus from changing the safety culture to something nebulously good or bad to changing management practices (social structure) based on a deep understanding of existing meanings and symbols (culture), both of which inform social action. This view of the usefulness of culture is supported by Amalberti (2013, p. 105):

If a local safety intervention has to be undertaken in an enterprise within a specific period of time, rather than expecting to change its culture, the opposite approach should be taken: deducing (from an assessment of the culture) what margin exists for real progress to be achieved by the enterprise, in view of its culture.

Understanding organisational culture as a metaphor rather than a variable to be manipulated (Alvesson, 2013) helps managers and OHS professionals to think culturally about their proposed changes to practices that focus on safety.

Organisational culture, reconceptualised as a metaphor and understood as a system of meanings and symbols that groups of managers and workers share and draw on to create safety, provides an important backdrop of understanding for evaluation of changes to organisational and management practices. Climate surveys should be used to measure changes effected by management practices, not as a starting point for culture change. In the longer term, changes in practices that favour safety may result in new metaphors, meanings and symbols characterising the evolution of organisational culture to focus more acutely on safety.

Borys, 2019; pp. 22-23.

Appendix 2: Summary of the post-2014 safety culture/climate evidence base

	Author (Year)	Country	Industry	Focus	Method	Results
1.	Kalteh, Mortazavi, Mohammadi & Salesi (2018)	Multi-national	Multi-industry	Safety culture, safety climate and safety performance	Systematic review	Reactive safety performance measures had a negative association with safety climate, e.g. as injuries go down, safety climate goes up. Proactive safety performance measures had a positive association with safety culture, e.g. as safety compliance goes up, safety culture goes up. Safety compliance was a more reliable predictor of safety performance. No studies evaluating safety <u>interventions</u> and safety performance.
2.	Aburumman, Newnam & Fildes (2019)	Multi-national	Multi-industry	Safety culture <u>interventions</u>	Systematic review	Found that workplace <u>interventions</u> positively impacted safety culture, but because of the weak methodological quality of the studies, results were inconclusive. The Danish Safety Culture Questionnaire and Zohar's safety climate scales were the most used outcome measurement tools. The conceptual foundations for safety culture remain unclear.
3.	Lee, Huang, Cheung, Chen & Shaw (2019)	Multi-national	Multi-industry	Safety climate <u>interventions</u>	Systematic review	Found that 89.5% of studies showed a statistically significant improvement in safety climate post- <u>intervention</u> . The two common <u>intervention</u> types were communication (around safe behaviour) and education and training (risk awareness, knowledge and skills).
4.	Nævestad, Hesjevoll & Phillips (2018)	Multi-national	Transport (road, sea, air and rail)	Safety culture <u>interventions</u>	Systematic review	Safety culture <u>interventions</u> are effective. <u>Interventions</u> focused on increasing risk awareness. Eight factors influencing safety culture change were top manager commitment throughout the <u>intervention</u> period, employee engagement and support, the relationship between managers and employees, motivation for the <u>intervention</u> , regulator focus on safety (culture) and support to companies, clear and congruent implementation, reorganisations and other processes taking attention away from the <u>intervention</u> , and the content of the <u>intervention</u> .
5.	Newaz, Davis, Jefferies & Pillay (2018)	Multi-national	Construction	Development of a safety climate model	Systematic review	Five common factors that emerged from the construction safety climate literature were management commitment, the role of the supervisor, safety management (the safety system), worker involvement and group safety climate.

	Author (Year)	Country	Industry	Focus	Method	Results
						These factors formed the basis of a five-factor safety climate model for construction.
6.	Leitão & Greiner (2015)	Multi-national	Multi-industry	Safety climate and occupational accidents	Epidemiology-based systematic review	Evidence was insufficient to clearly understand the association between safety climate and accidents or injuries. Studies at group and individual levels showed relatively strong evidence for an association between safety climate and accident or injury rates. More <u>intervention</u> evaluation studies are required.
7.	Oswald & Lingard (2019)	Australia	Construction	Maturity (development of a leadership maturity model)	Ethnographic; participant observation (100 hours) at four construction sites, followed by four one-hour focus groups	Six sources of important frontline leadership influence were the foreman and subcontractor supervisor relationship, the leadership styles of the foreman and supervisor, the foreman and workers' relationship, the subcontractor supervisor to supervisor relationship, the workgroup communication, and the relationship between the frontline leaders and the H&S advisors. A three-stage model of H&S leadership maturity was proposed: 1) Lacking in H&S participation; 2) Adopts a cooperative approach; and 3) Actively participating in H&S. The role of the OHS professional is important.
8.	Sternn, Bofinger, Cliff & Hassall (2019)	Ghana, West Africa	Mining	Maturity and safety performance (accident rates)	Survey of 828 employees from four mine sites using an adapted version of Hudson's five-level safety maturity model	Mine sites with lower incidence rates had higher safety culture maturity scores. Managers and workers found the framework useful and practical. The framework identified weak areas for improvement <u>interventions</u> .
9.	Behari (2019)	Not specified	Specialty gas operations	Maturity	Multi-methods (a process safety culture assessment toolkit; perception surveys; interviews; hydrocarbon leak incident history and four process safety maturity models)	Critical success factors were organisational learning and continuous improvement when supported by interdependent team leadership behaviours.
10.	Goncalves Filho & Waterson (2018)	Multi-national	Multi-industry	Maturity	Critical review	No firm conclusions could be drawn about the reliability and validity of using maturity models. Knowledge of the use of maturity models remains "immature."

	Author (Year)	Country	Industry	Focus	Method	Results
						The process of using a maturity model may be more important than the outcome.
11.	Bascompta, Sanmiquel, Vintró, Rossell & Costa (2018)	South America (Bolivia, Peru and Colombia)	Mining	Maturity	Questionnaire completed by 62 managers from small and large mine sites	Safety culture maturity was an adequate tool for mine sites. Safety culture maturity improved as the size of the mine site increases because procedures and control systems are in place on larger sites.
12.	Newaz, Davis, Jefferies & Pillay (2019)	Australia	Construction	Safety climate, safe behaviour and psychological contract	Survey of 352 construction workers	Safety climate influenced safe behaviour. Safety climate was related to the psychological contract of safety between workers and supervisors.
13.	Zhang, Pirzadeh, Lingard & Nevin (2018)	New Zealand	Construction	Safety climate and project completion	Longitudinal design using a multilevel safety climate measurement survey across four construction projects	Safety climate fluctuated (a downward trend) over the lifecycle of a construction project.
14.	Alruqi, Hallowell & Techera (2018)	Multi-national	Construction	Safety climate and safety performance	Meta-analysis of relationship between safety climate dimensions and safety performance	The analysis found five construction safety climate dimensions – supervisor's safety role, management commitment to safety, safety rules and procedures, individual responsibility to health and safety, and training – were commonly used predictors of injury rates.
15.	Andersen, Nørdam, Joensson, Kines & Nielsen (2017)	Denmark	Construction	Social identity	Questionnaire completed by 478 construction workers across two sites	Workers identified more with their workgroup than the construction site. Social identity and safety climate were stronger at the workgroup level. There was an inverse relationship between safety climate and self-reported accidents, particularly at the workgroup level.
16.	Nævestad, Phillips, Størkersen, Laiou & Yannis (2019)	Norway and Greece	Transport (sea)	National safety culture and worker behaviour	Questionnaire completed by 93 cargo and 76 passenger vessel crew members from Norway and 99 cargo and 99 passenger	Nationality had the strongest influence on alcohol consumption and injury rates. Worker behaviour, including violations, was most influenced by organisational factors, including demanding working conditions and the organisational safety culture.

	Author (Year)	Country	Industry	Focus	Method	Results
					crew members from Greece	
17.	Huang, Lee, McFadden, Rineer & Robertson (2017)	USA	Transport (trucking)	Multilevel safety climate and lone workers	8095 workers from eight trucking companies completed an industry-specific safety climate scale	Differences between workers' perceptions of organisational safety climate and group safety climate; both predict safe behaviour.
18.	Murphy, Robertson, Huang, Jeffries & Dainoff (2018)	USA	Transport (long-haul trucking)	Sociotechnical systems, macroergonomics and safety climate	27 semi-structured interviews with employees drawn from a horizontal slice from two companies with similar safety climate scores	Safety climate surveys were important but insufficient. Interviews, based on key areas of safety climate surveys, provided a richer understanding of work. This methodology can be used for designing <u>interventions</u> .
19.	Hopkins (2019)	Multi-national	Multi-industry	Organisational structure and culture	Accident case studies	Organisational structure created the culture of the organisation.
20.	Quinlan (2014)	Multi-national	Multi-industry	Pathways to accidents	Accident case studies	Organisational safety culture was not an explanatory factor.
21.	Cooper, Collins, Bernard, Schwann & Knox (2019)	USA	Not specified	Cultural web tool comprising eight topics	Actions research involving a mix of qualitative and quantitative approaches; data gathered via 15 safety culture workshops comprising 700 personnel	The cultural web tool was found to be a reliable method for assessing organisational safety culture and a valid method for linking organisational safety culture with safety performance (incidents).
22.	Qayoom & Hadikusumo (2019)	Pakistan	Oil and gas	Multilevel, system dynamics and safety performance	Consultation with six HSE managers, three operations managers and two field managers followed by workshops brainstorming links between safety culture and safety performance;	Safety culture at the middle management and operational level was much more effective than the top management level for improving safety performance.

	Author (Year)	Country	Industry	Focus	Method	Results
					influence diagrams were drawn and validated	
23.	Tear, Reader, Shorrock & Kirwan (2018)	Multi-national	Aviation	Power-distance and multilevel safety culture	A survey of 13,573 air traffic control staff from 21 national air traffic providers	Managers had a more positive perception of safety culture than frontline staff. Safety culture was perceived less positively in countries with high power-distance, particularly for those workers lower in the organisational hierarchy.
24.	Keiser & Payne (2018)	USA	Higher education	General versus context-specific safety climate measures	746 university laboratory workers completed contextualised and general safety climate surveys	General and contextualised safety climate measures were equally valid.
25.	Petitta, Probst, Barbaranelli & Ghezzi (2017)	Italy	Multi-industry	Multilevel, organisational safety climate and safety culture	Survey of 1342 employees from 32 organisations	Employee safety compliance was related to supervisor safety leadership and the safety climate and safety culture dimensions within the organisation.
26.	Karanikas, Soltani, de Boer & Roelen (2016)	Multi-national	Multi-industry	Gap between academic literature and industry guidelines	Gap analysis	A gap was found between industry guidelines and Reason's typology of safety culture. Only 59% of industrial guidelines referred to elements in Reason's typology.
27.	Tucker, Ogunfowora & Ehr (2016)	Canada	Multi-industry	Social learning theory	Survey of 2,714 frontline employees, 1,398 supervisors, and 229 members of top management teams across 54 organisations	CEOs have an indirect influence on workplace safety. A positive CEO safety climate has flow-on effects to supervisors and lower injury rates.

Note: Underlining indicates identified theme – 'interventions;' shading indicates identified method or thematic concentrations (method – systematic reviews and accident case studies; focus – maturity; industry – transport and construction).

Appendix 3: Findings from focused discussions with OHS professionals

The objective of the focused discussions was “to gain input from leading OHS professionals on the chapter to ensure that it achieves its objectives and is relevant to OHS professional practice.”

Initially, three focus groups were scheduled, but the low number of interested OHS professionals necessitated a change of plan. Of the 150 OHS professionals invited to participate, only five (1.5%) participated. As a result, two discussions were scheduled, one with three participants, one with two participants. This apparent low interest was explored with the discussion participants. Responses included “safety culture is an issue that is best handled by psychologists, not OHS professionals” and “safety culture is hard...it is a nightmare.”

Participant perspectives on safety culture ranged from ‘safety culture is important’ to ‘safety culture is not important.’ The middle ground was occupied by one participant who was interested in the “substance and science” of safety culture.

One participant felt that the research findings did not reflect the reality in his organisation. He stated that his organisation focused its entire operations around culture, and had collected a substantial amount of evidence, including via culture surveys, that demonstrated a focus on safety culture was delivering results. He said that culture for his organisation was built around collective expectations, leading by example, how managers respond to OHS issues and building relationships. Another participant, whose organisation had developed a safety culture maturity model, said that evidence from clients indicated that “organisations are measuring maturity and linking what they are doing to maturity improvement,” but conceded that there may be a gap between “maturity improvements and OHS outcomes.”

At the other end of the continuum, one participant said that he “struggled with the idea of safety culture” and that it was “subjective,” leading him to “struggle with the intent of the chapter...safety culture is difficult to articulate and is not a term that is used by my organisation.” He said that “it’s difficult to get consensus on definitions” of safety culture, that “organisational culture” should be the “broader” concept of concern, and that “we have not defined what ‘good’ looks like in relation to safety culture.” When asked what would happen if we stopped talking about safety culture altogether, he responded “business as usual.”

When asked for closing comments on the chapter, one participant said that there needs to be “an easier way to understand the intent of the chapter and how it applies in practice,” suggesting that “aspects and impacts” from environmental management may be one way to achieve this. Another participant said that what is important is how the chapter is “positioned and messaged so that it is best received by readers.”

Despite the low numbers of participants, the discussions pointed to two important findings. Firstly, the OHS professionals’ views on the importance of safety culture ranged from ‘important’ to ‘not important.’ This suggests that, in practice, whether an organisation focuses on safety culture may depend more on the worldview of individual OHS professionals rather than (or as well as) on the OHS profession as a whole. This raises questions about the sources of OHS professionals’ information on safety culture – industry, research, conferences, consultants, etc. – and possible implications.

Secondly, there appears to be a gap between practice and research. While the literature on the effectiveness of safety culture for improving OHS outcomes is inconclusive, individual organisations may have evidence for how a focus on safety culture is improving OHS outcomes. Industry evidence, which may influence the worldviews of individual OHS professionals, is rarely reflected in the research literature.

The findings of these discussions should be treated with caution due to the low number of participants. Whether they reflect the broader OHS profession and industry experience is unknown, but is something that would be worth knowing.

Appendix 4: Perspectives of organisational psychologists

A meeting was held with three organisational psychologists⁶ with expertise in safety climate and safety culture. The purpose of the meeting was to gain their feedback on a first draft of the chapter and to seek their perspectives on the constructs of safety climate and safety culture.

Four themes emerged from the discussion:

- Emphasising safety climate over safety culture
- Measuring safety climate
- Implications for the OHS professional
- Beware of 'culture' as a catch-all.

A4.1 Emphasizing safety climate over safety culture

Discussion moved back and forth on the relative merits of emphasising safety climate over safety culture:

Industry uses the word culture; we should just stop using the word culture because the climate construct is better defined, better measured, better evidence base. Culture [is] difficult to measure and define and collect evidence on.^(b)

Emphasizing safety climate at the expense of safety culture was challenged, however, because organisations risk losing the richness of understanding that safety culture offers.

Safety climate is much more established and much more rigorous but do we want to keep advocating this path of quantitative measurement?...If you are talking about climate, you do have to have a qualitative aspect, which is where the cultural aspect becomes important...If you put all your eggs in the climate basket, you are going to miss out on the richness in terms of meaning-making, belief systems...so be cautious about throwing away everything related to safety culture...How can we save this construct? It obviously means something to industry, it resonates with them. How can we salvage it?^(c)

Safety culture was deemed important, even though it may mean different things to different people. The definition of culture as *the way we do things around here* was challenged:

Whatever culture is getting at seems to be important for a lot of reasons... *The way we do things around here* seems a bit too broad. Is it the way we prioritise safety or

⁶ Professor Mark Griffin,^(a) Director, Future of Work Institute, Faculty of Business and Law, Curtin University

Dr Kirsten Way,^(b) Senior Lecturer, Centre for Business and Organisational Psychology, School of Psychology, The University of Queensland

Dr Tristan Casey,^(c) Lecturer, Safety Science Innovation Lab, Griffith University

the way we value safety? Climate can be assessed by what people think about that question whereas culture is a million different things.^(a)

However, safety culture was deemed messy and hard to measure, especially when compared to a clearer evidence base for safety climate. It was argued that, hierarchically, safety culture sits below safety climate, even though safety climate and safety culture are overlapping constructs:

I don't disagree that culture has a place...Culture is this broader values-based place that's messy and hard to measure and for that reason the evidence base is less clear...that's different to climate which still can be measured qualitatively. It's just more clearly defined around shared perceptions of policies, procedures and leader behaviours and all those things that can have a systemic focus. You can almost think of it hierarchically with culture as the deep well that if you get down to you are potentially swimming around in muck, but that's not that it's not important, but above that is the climate construct.

Culture and climate are overlapping constructs...Culture is the deeper version of the same thing [and] so hard to define...The thing that has been more defined and more measured and therefore more evidence-based is climate... The culture literature just doesn't provide the evidence base.^(b)

It was considered that OHS professionals should focus their attention on safety climate.

I think there is more benefit in emphasising safety climate over safety culture from a practitioner's perspective...Your best bang for your buck is shifting to a climate perspective – safety climate as the health check of your safety management implementation.^(c)

For health and safety professionals, that is where they should be staying because everything else is just too messy.^(b)

Part of the problem was seen as a lack of cooperative research efforts between industry and researchers:

One point is that finding good evidence around culture requires much bigger cooperation between data scientists, ethnographers and industry than currently exists in our fractured world of things. We just won't get that evidence base in the way we conduct research at the moment. That's the way it is. That's fine. We can only say what we do have evidence for, what people are doing, what we are trying to do, what would help get more evidence.^(a)

Unlike safety culture, there is good evidence for safety climate, as summed up by one participant:

I see the [safety climate] evidence is clearly saying if someone believes that their organisation truly cares about their welfare and safety and is committed to prioritising that across the organisation, people act more safely and organisations are safer...There is still a lot we don't know, especially in the field of culture.^(a)

In summary, the participants tended to agree that OHS professionals should emphasise and focus on safety climate over safety culture because there is good evidence for the relationship between safety climate and OHS outcomes, evidence that is largely lacking for the messier construct of safety culture.

A4.2 Measuring safety climate

Two themes emerged from the discussion on how to measure safety climate:

- Safety climate should measure the gap between work-as-imagined and work-as done
- Local safety climate measures should be developed and used rather than generic safety measures.

Building on the view of safety climate as a 'health check,' one participant advocated focusing on the gap between 'paperwork' and implementation:

If I was able to rebuild climate from scratch to make it as practical as possible, I would concentrate it on perceptions of systems and policies and procedures – the health check of your system's safety. To what extent is your system as imagined translating into your system as done...to decrease that gap between the paperwork and the implementation?^(c)

Supporting this view that safety climate should measure the gap between work-as-imagined and work-as-done, one participant argued that if climate measures do not measure the gap, then the measures are not working:

Climate measures don't work if they're not measuring work-as-done and highlighting that gap, then it's probably not going to be effective measurement process...The idea that the alignment between how things are really done and what you're trying to do is one of the key aspects of a safety culture.^(a)

There was agreement that safety climate measures should reflect the needs of individual organisations, that is, safety climate measures should be local, not generic:

Safety climate scales are very specific to each organisation; moving away from these generic, very vanilla kind of measures.^(c)

Further, it was argued that only one question is needed to measure safety climate:

Maybe I'd try a slightly different tack in not trying to explain everything through a safety climate assessment. If you are trying to find out what the climate is at the moment you only need one question: *How is safety valued and prioritised in this organisation?* And if you can get a completely honest answer to that question and understand it across the organisation, that's all you need. But getting that honest answer is extremely difficult, and in many ways not feasible. Whether they are telling the truth, whether they are in fear...A second question is: *Why are you seeing it this way?* For example, is safety prioritised in a punitive, narrow way or in a holistic way? But the core question is very simple.^(a)

A4.3 Implications for the OHS professional

Several implications for the OHS professional were identified. Firstly, that OHS professionals can use the constructs of safety climate and safety culture to help managers make better decisions:

Culture is more dynamic than we think; it is created through actions and inactions – culture is the meaning people take from those actions and inactions. The heart of culture is interpretation and meaning making in relation to manager actions or inactions. The OHS professional should be a data gatherer, an intelligence gatherer

to figure out and help leaders make better decisions on how their actions flow on and affect others in the organisation.^(c)

Secondly, OHS professionals should use a data collection process to understand the existing safety climate as the basis for developing targeted interventions:

In the first instance do a general data collection process by talking to managers in a vertical slice of the organisation about things like systems and policies and how they are interpreted and enacted, and what's being recognised and rewarded in terms of safety. Based on that, collecting data across the organisation that can be grouped meaningfully to measure the things that have been identified in the initial discussion. Based on that, coming up with a really targeted intervention that can be measured...qualitatively understanding what the issues might be, then quantitatively using what the evidence says influences these things.^(b)

Thirdly, OHS professionals should know their capability limits:

Knowing the limits of their capability and when to get professional help. There is not a one size fits all, so it really does take a professional to do the initial scoping and understanding of the organisational issues...Construct a measuring tool that matches the organisation's need. Know when to get help. Like occupational hygiene; they need to be organisational psychologists.^(b)

Don't walk away from culture, but maybe not a measurement role that's left to the academics and the experts to measure and describe the culture. The climate piece is more the practitioner-researcher partnership to make something more practical for measurement.^(c)

Finally, OHS professionals have a critical role to play as 'devil's advocate':

Safety climate is a practical diagnostic measurement tool, a leading indicator measurement...but I wouldn't want us to walk away from culture...[If, say, a] group of operations managers are talking about a safety-centric decision, the OHS practitioner considers culture by saying "look guys what assumptions are we making here about this particular hazard, or what sorts of things aren't we seeing"...Culture acts as a lens or a mask that blinkers people to certain bits of information because they have a dominant set of logics or beliefs that can highlight certain bits of risk and dismiss or ignore other bits of risk – that's where the practitioner's role comes to the fore, acting as a devil's advocate or a source of assumption checking and sense checking about why we are making these decisions and how they affect safety in the organisation.^(c)

A4.4 Beware of 'culture' as a catch-all

This advice is equally an 'implication for practice' as it is a way of thinking about culture. Two comments stand out: firstly, "when culture is everything, it's effectively nothing" and, secondly, "how to improve culture is not by trying to improve the culture":

Safety culture is a catch-all for too many things so part of the OHS role is to not allow people to put everything in that bucket, but it is an avenue to explore a lot of things that aren't really addressed in organisations...about how people work together. It can be too big a concept and people can use it to

catch everything; that's probably not a good thing for OHS, but it opens a door to various more specific ways of supporting and working with a complex place.

When culture is everything, it's effectively nothing. It's more talking about a capability than culture.

A simple way to think about culture: it's about how people interact and make meaning, together. And that's not everything. It's about communication, how people share information, to what degree they value the same things. That's culture. That's separate from your safety management system, your computerised recording keeping – it's just a way of containing what culture is.

How to improve the culture is not by trying to improve the culture. The more fundamental things are: Do people have the skills? Do they know how to talk to each other?...and leadership goes all across those things.^(a)