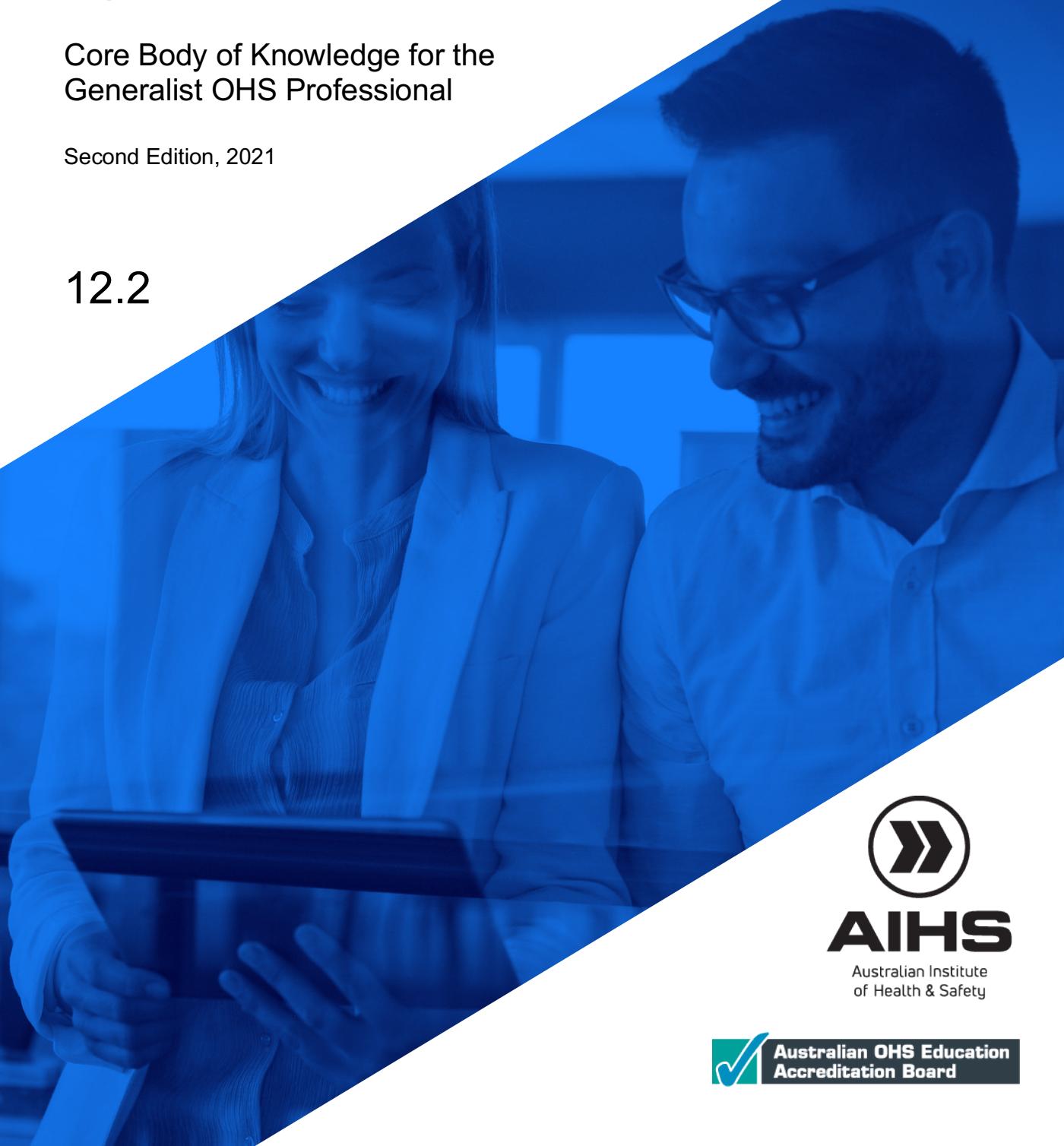


OHS Management Systems

Core Body of Knowledge for the Generalist OHS Professional

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12.2



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OHS Management Systems

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Pam contributed to this chapter by organising and delivering the OHS professionals' forum, analysing and reporting the forum results, and providing suggestions for improving several sections of the chapter.



OHS Professionals Forum

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Core Body of Knowledge for the Generalist OHS Professional

OHS Management Systems

Abstract

While organisations implement various programs and initiatives to ensure occupational health and safety (OHS), they do not always connect them under a systems perspective. An OHS management system (OHSMS) requires a holistic approach to risk management that is shared across the organisation. A systems approach provides systematic management for process consistency while recognising inevitable system variability, the interdependence of system elements, and the importance of participation and shared learning. A systems approach can ensure OHS is on par with other organisational business objectives and is likely to increase the probability of compliance with legal obligations. However, implementation of an OHSMS does not guarantee improvement in OHS performance, and the OHS professional should be cognisant of factors that are likely to increase OHSMS effectiveness. After proposing a definition of OHSMS, and briefly considering the historical and legislative contexts, this chapter presents an OHSMS element structure, and explores the outcomes of, first, research evaluating OHSMS effectiveness and, second, a discussion forum with OHS professionals. Drawing on both the literature and the practical perspective, the chapter concludes with implications for OHS practice, including a set of guiding principles for OHSMS development.

Keywords

safety, health, management, system, OHSMS

Contextual reading

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

Terminology

Depending on the jurisdiction and the organisation, Australian 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 a short section referring to the Australian model work 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

Occupational health and safety management systems (OHSMSs) have become almost synonymous with occupational health and safety (OHS). However, there is often a lack of understanding as to what constitutes an OHSMS and organisations do not always take a systems approach when implementing OHS initiatives. An OHSMS is not a documented standard or a collection of policies and procedures or, indeed, a ‘silver bullet’ for managing OHS. Implementation of an OHSMS does not guarantee improvement in OHS performance. There is a need for critical analysis of the role of OHS management systems in OHS and the associated facilitators, barriers and implications for OHS professional practice.

To provide OHS professionals with an understanding of OHS management systems and guidance for developing and implementing an effective OHSMS, this chapter draws on the outcomes of relevant research and a discussion forum with OHS professionals. After proposing a definition of OHSMS based on consideration of its constituent terms – ‘occupational,’ ‘health and safety,’ ‘management’ and ‘system’ – the historical and legislative contexts are briefly reviewed in sections 2 and 3, respectively. Section 4 (supported by the Appendix) categorises the organising elements of an OHSMS and links these with other *OHS Body of Knowledge* chapters to demonstrate how the elements interact. This emphasises that an OHSMS is a holistic approach rather than a separate OHS management tool. Section 5 draws on the results of published research to consider the effectiveness of OHSMSs both as systems and in terms of their impact on OHS objectives and identifies associated facilitators and barriers. Section 6 reports the outcomes of an OHS professional forum held to discuss OHSMSs, and these practical perspectives inform implications for OHS practice presented in section 7.

1.1 What is an OHSMS?

There are several approaches to defining OHS management systems. As noted by Gallagher et al. (2001), the existence of various definitions has inhibited discussion about OHSMSs and contributed to a lack of consensus about how to evaluate their effectiveness (see Section 5). Furthermore, it has been asserted that OHSMS definitions “have been watered down, making it more likely that organisations can claim to have a system, but less likely that it will be effective” (Gallagher et al., 2003, p. 67). OHS management systems are often defined in simple terms such as “An OHSMS is a coordinated and systematic approach to managing health and safety risks” (WorkSafe Victoria, 2020).

In *ISO 45001:2018 Occupational Health and Safety Management Systems – Requirements with Guidance for Use*, the International Organisation for Standardization (ISO) defined an OHS management system and related terms in the following manner:

management system

set of interrelated or interacting elements of an organization to establish policies and objectives and processes to achieve those objectives ...

OH&S management system

management system or part of a management system used to achieve the OH&S policy. ... The intended outcomes of the OH&S management system are to prevent injury and ill health to workers and to provide safe and healthy workplaces ...

OH&S policy

policy to prevent work-related injury and ill health to workers and to provide safe and healthy workplaces (ISO, 2018a, pp. 3, 4).

In the ISO definitions, the concept that a management system is 'used' casts the user as an external agent rather than a component of the system itself; this negates the definition of a system and instead presents the OHSMS as a tool. Also, ISO 45001:2018 views OHS policy in terms of its purpose rather than as one of many interacting OHSMS elements. Although prevention of negatives is the desired outcome, the ISO definitions somewhat imply an approach that connects the success of an OHSMS with the absence of problems without considering the success of all coordinated efforts to guard and promote OHS.

Frequently, definitional focus is on what an OHSMS does rather than what it is. For example:

An SMS¹ is an ongoing activity and effort directed to control accidental losses by implementing and monitoring critical health and safety elements, processes, or programs on an ongoing basis. ...

An SMS prescribes certain elements, processes, and programs that offer opportunity for risk reduction, and gives details of what should be done on an ongoing basis to maintain workplace risk as low as is reasonably practicable. An SMS is a formalized approach to health and safety management through the use of a framework that aids the identification and control of health and safety risks. (McKinnon, 2020, pp. 4, 11)

McKinnon's (2020) definition rather presents an OHSMS as a prescriptive approach that leans more towards the notion of control than management. It does not acknowledge that OHSMSs have informal aspects, such as OHS-related discussions and debates among workers or the potential for improvement by leveraging opportunities.

The remainder of this section presents an alternative approach to defining an OHS management system by considering the meanings of its constituent terms – 'occupational,' 'health and safety,' 'management' and 'system.'

The first constituent, **occupational**, indicates the scope, that is, the work setting. Notably, ISO 45001:2018 and Australian legislation do not restrict this scope to workers involved in job tasks, but rather extend it to anyone present at a workplace or directly affected by the

¹ McKinnon (2020) used the term Safety Management System (SMS) to cover both health and safety.

work (e.g. contractors, visitors, customers). Nevertheless, workers of all job types and organisational levels remain the primary focus.

The literature offers several definitions of the terms 'health' and 'safety,' which overlap to some degree.² When combined, **health and safety** refers to the physical and psychological state of individuals that is necessary for wellbeing and performance, with individuals being subject to the effects of factors they may not directly control. This suggests that OHS must incorporate consideration of:

- The context within which worker wellbeing and performance are considered; in the *OHS Body of Knowledge* this is occupational activities
- The system within which direct control over positive and negative OHS-related factors can be assumed
- Internal and external factors that cannot be directly controlled.

Although health and safety are immaterial constructs, their meaning in occupational settings gains clarity by contemplating their absence. The absence of safety is usually connected with immediate and visible effects (e.g. physical injuries or psychological collapse due to acute exposure to intense stressors). On the other hand, the absence of health is usually associated with latent effects (e.g. physical and psychological illnesses developing after long-term exposures to adverse conditions) or immediate but initially invisible harm (e.g. contact with chemicals over short-term or peak exposure limits).

Notably, the absence of safety can produce adverse effects on health and vice versa. For example, a worker suffering from a physical injury can develop problems with physical health (e.g. permanent disability, infection of a wound) and/or mental health (e.g. anxiety, depression). Similarly, health issues may result in unsafe conditions by, for example, impacting a worker's ability to concentrate, process environmental stimuli or make informed decisions. By extension, initiatives to ensure safety should not threaten health and vice versa. For instance, masks may guard against harmful substances, but can inflict safety-related problems if they lower the ability of workers to maintain awareness of their environment, hinder communication or generate significant inconvenience (e.g. humidity and heat). Hence, in occupational settings, health and safety must be considered in tandem.

The third constituent, **management**, suggests implementation of a set of coordinated actions to achieve OHS. Unlike the term 'control,' management recognises the potential for variability within a system.³ Variability can include the number and characteristics of system

² See *OHS BoK 5 Global Concept: Safety* and *OHS BoK 6 Global Concept: Health*.

³ Nevertheless, the concept of control applies to technical system elements; see *OHS BoK 13 Managing Process Safety*. For information on variability within systems, see *OHS BoK 12.1 Systems and Systems Thinking* (in development at time of writing). For a review of the variability in human

elements, and changes in performance, frequency, intensity, direction and other parameters of their interactions.

The fourth constituent, **system**, has been defined as “any group of interacting, interrelated, or interdependent parts that form a complex and unified whole that has a specific purpose” (Kim, 1999, p. 2). Meadows (2008) agreed that a system consists of elements, interconnections, and a function or purpose.⁴ In this chapter, therefore, system refers to the set of interacting, interrelated and interdependent parts directed to managing OHS to control risk, prevent injury and ill-health and maintain and enhance human performance and wellbeing. Importantly, people, technology and the environment are components of the OHSMS, not OHSMS resources or users. Some of these system agents may enhance the OHSMS, some may resist change and adaptation, and others may even threaten the OHSMS; however, they are part of the OHSMS whether or not their contributions are appreciated.

Finally, the words ‘occupational health and safety management system’ could generate the impression that they refer to a system of managing health and safety. However, as noted above, health and safety are immaterial constructs that cannot be managed directly. Given the above consideration of constituent terms, this chapter proposes the following definition:

An OHS management system is a set of tangible and intangible elements that can vary over time but interact in a coordinated manner under the collective purpose to protect and promote the physical and psychological integrity of those present in an occupational setting or directly affected by its occupational activities.

2 Historical perspective

OHS management systems evolved from quality management approaches (Gallagher et al., 2003). As explained by Koskela et al. (2019), the quality movement began in the 1930s, focusing initially on statistical quality control based on inspection or sampling and then on process control and application of the ‘seven tools of quality management’.⁵ Subsequently, emphasis shifted to continuous improvement processes incorporating total quality

characteristics and performance, see *OHS BoK 7 The Human as a Biological System*, and *OHS BoK 8.2 Individual Differences and Work* (in planning at time of writing).

⁴ See *OHS BoK 12.1 Systems and Systems Thinking* (in development at time of writing).

⁵ Cause-and-effect diagrams, check sheets, control charts, histograms, pareto charts, scatter diagrams and flow charts (ASQ, 2021a).

management (TQM), the Plan-Do-Check-Act cycle and the ‘new’ seven tools of quality management.⁶

By the 1990s, the concept of OHS management systems was well established. The introduction of proprietary systems such as the National Safety Council of Australia’s 5-Star system (NSCA, 1987) and the International Safety Rating System (ISRS),⁷ was accompanied by vigorous debate about the relevance and utility of such systems (e.g. Bottomley, 1999; Gallagher et al., 2001). Implementation of OHSMSSs in Australia was encouraged by the various state OHS regulators who developed audit tools and, in some cases, offered incentives for certification in the use of these tools (Bottomley, 1999; Gallagher et al., 2001).⁸ Promotion of certification as a competitive and/or reputational advantage saw the emergence of certification by third-party auditors.

The creation of a global framework for OHSMSSs, first discussed by the International Organization for Standardization (ISO) in the 2000s, suffered three failed attempts to reach consensus (Neag et al., 2020) due to different expectations for a global standard:

Some want a standard that companies, particularly those in developing countries, can use to implement a management system to improve their safety performance – in other words, a helpful tool. Others seek a standard that sets specific performance requirements that organizations are expected to meet to prevent workers from being exposed to work-related hazards – in other words, a global regulation. Still others want a standard that will help organizations with existing safety programs achieve “best in class” performance – in other words, a continual improvement methodology for OHS professionals to use. (Dunmire, 2016)

In the absence of a global framework, regional standardisation bodies took action. In 1991, the British Standards Institution (BSI) issued *OHSAS 18001: Occupational Health and Safety Assessment Series* (OHSAS; BSI, 2007) and proposed it as the basis for an international standard (Jones, 2018). Compatible with the ISO environment and existing quality management standards, OHSAS 18001 was relatively easy for organisations to adopt (O’Connell, 2004) and quickly became the OHSMSS benchmark internationally (Manuele, 2005; O’Connell, 2004). In 2001, Standards Australia and Standards New Zealand collaborated to combine Australia’s AS 4801:2000 and New Zealand’s NZS 4801(Int):1999. The resultant AS/NZS 4801:2001 *Occupational Health and Safety*

⁶ Affinity diagrams, interrelationship diagrams, tree diagrams, matrix diagrams, matrix data analysis, arrow diagrams, process decision program charts (ASQ, 2021b).

⁷ For information about the history of the ISRS, see <http://www.isrs.net/About-ISRS-Book-of-Knowledge>

⁸ For example: Safety Manager Achievement Program (SafetyMAP) (Victoria); Safety Achiever Bonus Scheme (SABS) (South Australia); WorkSafe Plan (Western Australia) (Bottomley, 1999; Gallagher et al., 2001).

Management Systems – Specification with Guidance for Use (SA/SNZ, 2001) presented a framework that could be used for internal and third-party audits of OHS management systems. Some other countries also created their own OHSMS standardised frameworks. For example, the American National Standards Institute released the first edition of *Z10 Occupational Health and Safety Management Systems* in 2005 (ANSI/AIHA, 2005).

In 2013, under pressure from the international community, ISO agreed to pursue a global standard for OHS management systems (Dunmire, 2016; Neag et al., 2020). A project committee representing more than 70 countries, including Australia, undertook development of the global standard informed by OHSAS 18001, *ILO-OSH 2001: Guidelines on Occupational Safety and Health Management Systems* (ILO, 2001) and *ISO 14001 Environmental Management Systems* (ISO, 2015) to establish a unified, holistic system for managing OHS (Rostyku et al., 2016). Released five years later, *ISO 45001 Occupational Health and Safety Management Systems – Requirements with Guidance for Use* (ISO, 2018a) aimed to set a minimum global standard of employee protection (ISO, 2018a,b). Australia and New Zealand adopted ISO 45001 by publishing AS/NZS ISO 45001:2018 *Occupational Health and Safety Management Systems – Requirements with Guidance for Use* (SA/SNZ, 2018), which superseded AS/NZS 4801:2001.

3 Legislation

Contemporary adherence to the OHS legislative framework and accompanying regulations, codes of practice and, to some extent, industry standards, means that organisations already operate some of the OHS management system organising elements presented in the following section and the Appendix to this chapter. This is expected as OHS legislation in Australia imposes a duty of care on the person conducting a business or undertaking (PCBU) to provide a workplace and system of work where risks to health and safety are controlled “so far as is reasonably practicable” (WHS Act s 19; SWA, 2019).⁹ Although the legislation does not explicitly refer to OHS management systems, it includes several related provisions. For example, the *Model Work Health and Safety Regulations* (SWA, 2021) refer to a requirement for a WHS management plan for principal contractors (s 309) and safety cases for major hazard facilities (Part 9.3) and make other references to safety management systems (s 558 and Schedule 17).

4 OHSMS organising elements

As noted in section 1.1, an OHS management system encompasses tangible and intangible elements that interact. A systems approach dictates that the primary goal of risk

⁹ For information about the duties of PCBUs, see *OHS BoK 9.3 Work Health and Safety Legislation in Australia*.

management is not an isolated element, but rather a set of activities that targets OHS outcomes, facilitates various other OHSMS elements (e.g. incident investigations, audits) and is supported by other elements (e.g. commitment, leadership, OHS training and education). In this manner, elements can simultaneously perform different system roles as inputs, processes, outputs and feedback channels. This section, to be read in conjunction with the Appendix, focuses on element categorisation, which can serve to organise an OHSMS.

Madsen et al. (2020) demonstrated that OHSMS elements can be grouped into three dimensions – institutional, operational and compliance, which also reflect the system development levels described by Accou and Reniers (2020):

- *Institutional elements*, representing the context, framework and directions (design and specification level)
- *Operational elements*, including processes, activities and tasks that realise the institutional elements (implementation and performance level)
- *Compliance elements*, which reveal gaps between the institutional and operational elements, highlighting necessary changes (verification and adaptation level).

In addition to categorising elements as institutional, operational and compliance,¹⁰ the Appendix (summarised in Table 1) includes three subclassifications – foundation, specific and resultant.¹¹ Foundation elements form the backbone for other OHSMS elements; they drive and determine the success of specific elements, which, in turn, generate resultant elements (Figure 1). The elements listed are not exhaustive and do not represent the whole range of tangible and intangible components of the work system that are shared with other management systems (e.g. workers and technology, cultures and norms). In the Appendix, the elements are linked to relevant *OHS Body of Knowledge* chapters, emphasising that an OHSMS is integrative rather than a separate management tool.

Table 1: Summary of OHSMS organising elements¹²

	Foundation	Specific	Resultant
Institutional (Design and specification)	<ul style="list-style-type: none"> • Context • Commitment • Leadership • Variability tolerance 	<ul style="list-style-type: none"> • Scope • Integration • OHS policy • OHS objectives • Roles 	<ul style="list-style-type: none"> • Documentation

¹⁰ Despite some negative connotations of the word ‘compliance,’ it is part of the OHSMS improvement cycle and not a channel for judgement or blame. If preferred, the word compliance can be replaced with, for example, evaluation, verification or review (allowing for slight variations in meaning).

¹¹ The subclassifications are based on the knowledge and experience of this chapter’s first author.

¹² The order of listed elements does not indicate significance or preferential sequence.

	Foundation	Specific	Resultant
Operational (Implementation and performance)	<ul style="list-style-type: none"> • Communication • Participation 	<ul style="list-style-type: none"> • Incident management and investigation • Return to work • Risk management • Process safety and other safety domains • Contractor management • Procurement and outsourcing • OHS education, training and competency • Emergency preparedness • Management of change • Record keeping 	<ul style="list-style-type: none"> • Achievement of OHS objectives • Shared learnings
Compliance (Verification and adaptation)	<ul style="list-style-type: none"> • Criteria and indicators 	<ul style="list-style-type: none"> • Audits, inspections, observations, reviews • Studies, research 	<ul style="list-style-type: none"> • OHSMS improvement and adaptation

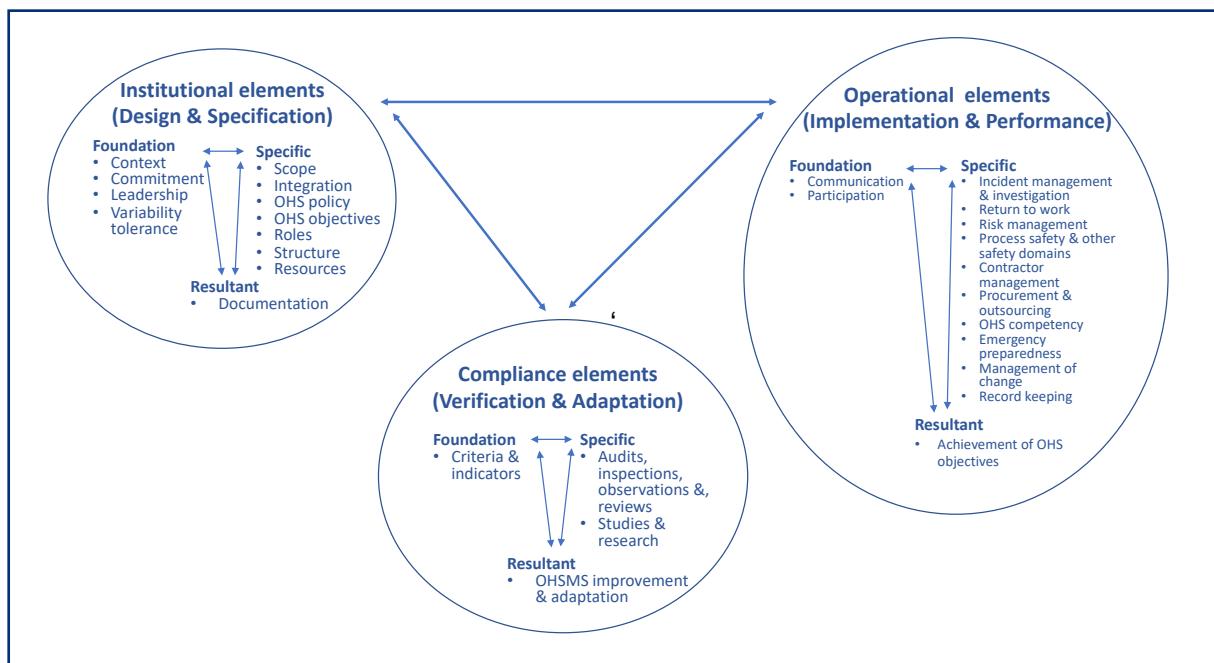


Figure 1: OHSMS organising elements

The combination of OHSMS organising elements can shape and inform:

- Models – high-level descriptions of the internal and external environments in which the OHSMS operates, with an abstract definition of the practices and interrelationships required to fulfil its purpose
- Frameworks – that complement models and outline the structures, plans and system elements and interactions required to achieve the OHSMS goals
- Methods – that specify how frameworks can be operationalised and the approaches necessary to achieve the OHSMS goals (Nilsen, 2015; O'Brien & Dyson, 2007).

These models, frameworks and methods represent ‘work-as-imagined’, which will inevitably differ from actual work and outcomes, commonly labelled ‘work-as-done’ (Hollnagel, 2014). OHSMS compliance elements aim to reveal and close such gaps; however, given they are performed by less-than-perfect humans operating in less-than-optimum environments and using less-than-perfect tools to collect and process less-than-perfect data, they cannot generate a complete and accurate picture of the system. The context-specific nature of implementation means that gaps may differ in number, type and magnitude, and that compliance elements require careful planning and specifications. Similarly, as institutional elements are subject to context-specific planning involving, for example, identifying, collecting and processing information, and discussing and debating ideas and decisions, no version of institutional elements can capture and combine everything perfectly. However, the more an OHSMS evolves based on effective integration, learning, motivation, translation and attention (Madsen et al., 2020), the smaller the gaps will be and the more likely it is that the OHSMS will fulfil its purpose (see also Section 5).

5 The effectiveness of OHSMSs

Although the successful implementation of an OHS management system has been identified as the cornerstone of an effective OHS risk-management approach (Sinclair, 2012) and a top priority for organisations (Mohammadfam et al., 2016), researchers have been discussing the evaluation of OHSMSs and whether OHSMSs positively impact OHS outcomes for decades (e.g. Robson et al., 2007; Yorio et al., 2015; da Silva & Amaral, 2019; Madsen et al., 2020). So do OHSMSs deliver positive results for the broader organisational system and improve OHS and economic performance or do they have little or no positive impact while increasing bureaucracy? The answer seems to be that OHSMS effectiveness depends on whether certain conditions are met.

In 2001, Gallagher et al. concluded that:

OHSMS can deliver more healthy and safe workplaces under the right circumstances. ... The research and consultations strongly indicate that such success is conditional upon a range of factors, including the kind of system used, senior management commitment, integration into general management systems and effective employee participation.

OHSMS can succeed, but in the wrong circumstances they will also fail (Gallagher et al., 2001, p. vii).

Two decades later, Madsen et al. (2020) reported that the effectiveness of OHSMSs was still a subject of debate due to lack of clarity about their mechanisms of action and that “certain combinations of context and mechanisms” were necessary for OHSMS success. Madsen et al. determined that successful delivery of institutional, operational and compliance elements is dependent on five mechanisms:

- Integration – utilising existing structures
- Organisational learning – developing capabilities and continuously improving
- Motivation (for certification) – preferably internal goals rather than external pressures
- Translation – customising to suit organisational context
- Attention – prioritising key OHS issues (e.g. via audits).

Assessment of whether an OHS management system performs as expected is a crucial, but not always easy, task. This section reviews some of the research that has addressed: firstly, evaluation of OHSMS performance as a system; secondly, evaluation of the impact of OHSMSs on OHS objectives; and, thirdly, facilitators and barriers associated with OHSMS implementation. It provides examples of methods that could be tailored to evaluate an OHSMS. While OHSMS evaluation has tended to be characterised by lack of uniformity in approach, it is evident that an inclusive and valid evaluation scheme requires systematic collection and analysis of quantitative and qualitative data.¹³

5.1 Evaluation of OHSMSs as systems

Assessment of the performance of OHSMSs as systems is not the same as evaluating whether OHSMSs deliver OHS improvements. Irrespective of OHS outcomes, an OHSMS may not deliver positive results for the broader system because of inadequate design or unidentified/unmanaged internal or external issues. Also, the methods and instruments used to evaluate an OHSMS may be incapable of holistically capturing the system’s performance. If the evaluation strategy and methods are not properly designed and implemented, then results can be misleading, showing that an OHSMS performs whereas it may not and vice versa.

¹³ Approaches to evaluating OHSMSs are presented to inform OHS professionals rather than to recommend any specific method.

For example, the validity of audits (which are widely used to evaluate OHSMS performance) is often questioned.¹⁴ In general, issues with audits arise from two fronts (Blewett & O'Keeffe, 2011; Harrison & Goode, 2018):

- A focus on compliance with the implementation of system specifications from binary (Yes/No) or quantitative (e.g. frequency of implementing an element) perspectives without considering design, quality and temporal parameters
- Audit management and procedural issues.

Blewett and O'Keeffe (2011, p.1017) explained that OHS auditing inherited some of the issues associated with its precursor, financial auditing, and is subject to several other categories of failure:

Tackett (2004) identified four failures of [financial] audits: unintentional errors of the auditor, deliberate fraud by the auditor, financial interests from auditor consulting causing undue influence, and undue influence arising from personal relationships between the auditor and client. In our practices we have observed five further categories: failure to allow worker participation; paperwork for the sake of the audit; unintended consequences and potential goal displacement of audit scoring; the confusion of audit criteria; and lack of auditor independence and skill.

The scope of OHS auditing goes beyond analysing objective and tangible matters (e.g., whether the machine guard is on or off) to include evaluation of intangible psychosocial aspects relating to organisational power and influence, leadership and relationships. Jespersen et al. (2016) identified challenges associated with auditing psychosocial risks, which are strongly context dependent and cannot be observed in the same manner as physical OHS risks.

Bornstein and Hart (2010) demonstrated that evaluation of an OHS management system can be improved by:

- Tailoring an evaluation instrument to the needs and context of the organisation or its specific workplaces
- Considering current research on OHSMSSs.

Importantly, effective design of a tailored evaluation tool requires a participatory approach. Bornstein and Hart's study featured an intense collaboration process involving managers, workers and academic consultants.

¹⁴ Auditing deficiencies have been linked with several major OHS-related disasters, including the Piper Alpha accident (Paté-Cornell, 1993), the Moura Mine explosion (Hopkins, 1999), the Longford gas explosion (Hopkins, 2000), the Texas City Refinery disaster (Hopkins, 2008) and the Deepwater Horizon blowout (Hopkins, 2012).

Redinger and Levine (1998) described a general-to-specific measurement hierarchy that can guide OHS management system evaluation and development of measures tailored to organisational context:

1. Identify the construct(s) to be measured (e.g., the state of the three OHSMS element categories – institutional, operational and compliance)
2. Identify the indicator(s) associated with those construct(s) (e.g., the foundation, specific and resultant elements within each OHSMS element category)
3. Identify the OHS variables associated with the indicator(s) that comprehensively represent the latter's actionable and observable aspects (e.g., for the element of management systems integration, variables could be: *OHS is addressed by other management systems, the OHSMS addresses the objectives of other management systems, OHSMS and other management systems exchange methods and best practices*)
4. Establish operational definitions for the variables. This is the most challenging step as these definitions ideally encompass quantity, quality and temporal parameters and combine quantitative and qualitative data to provide an inclusive picture (e.g., if *Health and safety communication with other companies* is a variable for the indicator *External health and safety communication*, then the number, quality and timeliness of communications could serve as operational definitions for measurement).

In alignment with Redinger and Levine's (1998) guidance, Costella et al. (2009) proposed a method of performing more comprehensive OHSMS evaluations by combining three OHS auditing approaches:

- Structural – assessment of the system (i.e., institutional elements in the Appendix)
- Operational – assessment of the implementation of OHSMS activities (i.e., operational elements in the Appendix)
- Performance – assessment of the results of performance indicators (i.e., compliance elements in the Appendix).

Costella et al. recommended taking a resilience engineering¹⁵ approach to OHSMS evaluation via the application of four principles – top management commitment, flexibility (of work system design), learning (from both incidents and normal work) and awareness (of system status). These resilience engineering principles are permeated by:

...proactiveness, which refers to anticipating problems, needs or changes, and which leads to actions being drawn up which directly alter the surroundings of the environment. In terms of HS, proactiveness refers to anticipating hazards and control measures so as to interrupt the evolutionary course of incidents. (Costella et al., 2009, p. 1058)

¹⁵ “A system is resilient if it can adjust its functioning prior to, during, or following events (changes, disturbances, and opportunities), and thereby sustain required operations under both expected and unexpected conditions” (Hollnagel, 2016).

One manifestation of this is the development of proactive indicators. In contrast to reactive/lagging indicators (e.g., accident rates, workers' compensation claims), proactive/leading indicators focus on measurement of proactive activities.¹⁶ For example, Almost et al. (2018, 2019) assessed the effectiveness of six leading OHSMS indicators – senior management commitment, continuous improvement, communication, competence, employee involvement and occupational health management¹⁷ – and concluded that “the utilization of leading indicators to assess an organization’s current OHSMS, identify areas for improvement, and implement tailored interventions is feasible to support a culture of safety in healthcare” (Almost et al., 2019).

An approach recommended for organisational self-assessment of OHSMSs in aviation included an instrument – the Aviation Academy Safety Management Systems (AVAC-SMS) metric – that quantifies three dimensions:

- *Institutionalisation* (i.e. design and implementation along with time and internal/external process dependencies),
- *Capability* (i.e. to what extent managers have the capability to implement the SMS), and
- *Effectiveness* (i.e. to what extent the SMS deliverables add value to the daily tasks of employees) (Karanikas et al., 2019, p. 2).

Different versions of the AVAC-SMS were developed to accommodate organisations of different sizes and to facilitate evaluation of either the whole OHSMS or particular elements (Karanikas et al., 2018, 2019). Karanikas et al. (2019) argued that overall OHSMS performance could be estimated via the product of institutionalisation, capability and effectiveness scores, but acknowledged that such a quantified assessment should be a starting point and that “depending on the results...organisations can proceed to collection of qualitative data with a focus on the weakest areas revealed by the initial assessment” (Karanikas et al., 2019, p. 2).

To investigate methods of OHSMS performance measurement in the US mining sector, Haas and Yorio (2016) designed a survey based on the US National Mining Association’s 20-element OHSMS (CORESafety) and its corresponding 133 practices (i.e., variables as per Redinger and Levine’s terminology above) and administered it to nine mine-site OHS professionals. Study participants were asked how they measured the performance of each practice or, if not currently practiced, to provide their opinion on the best possible metric for the practice. While similarities in their responses led to the emergence of three categories of performance indicators – organisational performance, worker performance and interventions – there were notable differences related to quantitative versus qualitative measurement and objective versus subjective metrics (Haas & Yorio, 2016). Overall, the study confirmed the need to employ both quantitative and qualitative performance indicators along with objective and subjective measures to gain a representative view of an OHS management system.

¹⁶ For a review of indicator types, see, for example, Haas and Yorio (2016).

¹⁷ Most of these would be categorised as foundation OHSMS elements (Table 1, Appendix).

Recently, for example, a method for assessing the implementation of safety management best practices that drew on systems thinking and a combination of quantitative and qualitative data was tested in ten construction sites in Brazil and the results provided insights into the degree of implementation and the interactions between practices (Bridi et al., 2021, p. 11).

5.2 Evaluation of the impact of OHSMSSs on OHS objectives

This section presents the outcomes of several studies that have evaluated the effectiveness of OHS management systems in terms of cost-benefit and OHS outcomes. As previously noted, research into the effectiveness of OHSMSSs has produced equivocal results, which depend heavily on the OHSMSS evaluation method. Also, the way OHS performance is measured has been long debated, and the quantification of indirect costs of adverse events remains a challenge when evaluating monetary returns.¹⁸ Furthermore, results of investigations of OHSMSS-OHS linkages must be approached cautiously due to the diversity of methods, organisational contexts and industry sectors.

An effective OHS management system requires a balance between (Karanikas et al., 2020):

- Systematic management, which aims to maximise consistency and minimise variability in the system (via top-down policies, rules, etc.) and
- Systems thinking, which values bottom-up feedback and engagement and recognises that performance variability cannot be fully suppressed or controlled.

The degree to which such a balance will be achieved depends on local factors (e.g. nature of operations, organisational culture, management appetite, workforce competencies) that are not always accounted for in studies investigating the conditions under which OHS management systems succeed or fail.

Cost-benefit

Although a significant consideration, the cost-benefit of investments in health and safety has not been widely studied. However, it is important to estimate whether OHS initiatives beyond the minimum legal obligations are worth the investment. Determination of cost-benefit ratios may include evaluation of (Gavious et al., 2009):

- Direct costs (e.g., damages, medical treatment, regulatory fines, insurance premium

¹⁸ See OHS BoK 12.5 OHS Performance Evaluation (in planning at the time of writing). Also, OHS professionals must remain aware that no study is perfect; research is performed under various limitations, and no analysis can capture the whole OHSMSS in a single work.

increases)

- Indirect costs (e.g., production capacity losses, delivery delays, inventory disruptions, recruitment and payment of additional staff, investigation costs, diversion of managerial time from other business matters)
- Immeasurable costs (e.g., damage to business reputation, impact on worker morale).

Sun (2010) developed a quantitative return-on-investment (ROI) model for OHSMSs in the Australian construction industry. After testing this model, Sun concluded that “investment in construction safety management will lead to better safety performance and consequently bring economic benefits to construction companies” (p. 101). As a limitation of such models, Sun (2010) acknowledged the difficulty, or indeed impossibility, of measuring in monetary terms the intangible benefits (e.g., reputation and worker motivation), which may be greater than the tangible benefits.

An investigation of the impact of OHSAS 18001 certification on the financial performance of 44 fashion and textile companies in the United States found that adoption of the standard positively impacted sales performance but negatively impacted return on assets (ROA)¹⁹ (Fan & Lo, 2012). This was attributed to the motivation for OHSMS implementation being satisfaction of customer requirements rather than a genuine interest in long-term improvement of health and safety, resulting in maintenance of the OHSMS becoming a burden (Fan & Lo, 2012).

Javad and Mehjabeen (2019) investigated the profitability of an OHSMS-implementation project in Iran and found the mean value of the internal rate of return (IRR) to be 22%, with a minimum of 14%. Since these values were higher than the market IRR rate of 7%, the authors deemed the OHSMS implementation an economically advisable project.²⁰

OHS outcomes

Approaches to investigating the relationship between OHSMSs and OHS outcomes include application of:

- Self-designed methods to measure the performance of the OHSMS and its elements

¹⁹ ROA “is a type of return on investment (ROI) metric that measures the profitability of a business in relation to its total assets. This ratio indicates how well a company is performing by comparing the profit (net income) it’s generating to the capital it’s invested in assets. The higher the return, the more productive and efficient management is in utilizing economic resources.” (CFI, 2021)

²⁰ IRR “is the discount rate that makes the net present value (NPV) of a project zero. In other words, it is the expected compound annual rate of return that will be earned on a project or investment” (CFI, 2021).

against OHS performance. Researchers often use their own instruments, which may vary across management systems and performance indicators.

- Results from certification audits. The assumption is often made that certification is consistent everywhere and over time and accurately represents OHSMS performance; this is not always the case.

Although more research is warranted, it should be acknowledged that sometimes it may be an inadequate or invalid approach to system evaluation, rather than the OHSMS, that does not deliver (section 5.1).²¹

Arocena and Núñez (2010) analysed the effectiveness of OHS management systems in 193 Spanish small and medium manufacturing enterprises that they categorised as:

- *Advanced* for OHSMSSs that scored highly across all preventative dimensions that shape the most effective OHSMSSs
- *Technical* for OHSMSSs that scored below the sample average for people-oriented and organisational variables, but above average for technical activities (e.g., planning, control and physical ergonomics)
- *Basic* for OHSMSSs with average scores across all dimensions, with insignificant differences between technical, people-oriented and organisational variables
- *Missing* for OHSMSSs that scored below the sample average, indicative of little concern about OHS.

The study revealed that those companies ‘missing’ a visible and active commitment to OHS experienced the highest accident rates, followed by firms that focused on technical improvements. The ‘advanced’ enterprises that adopted a holistic approach to OHS and combined technical, people and organisational aspects demonstrated the lowest accident rates (Arocena and Núñez, 2010).

Also in Spain, Abad et al. (2013) analysed data from 149 firms and found adoption of OHSAS 18001 to be associated with significant improvement in accident rates and labour productivity, with this improvement more pronounced in organisations with years of experience with OHS management systems. With a sample of 5,147 Spanish firms, however, Heras-Saizarbitoria et al. (2019) found only a loose relationship between OHSAS certification and OHS performance improvement. OHSAS 18001-certified companies experienced lower rates of minor and serious accidents in some industry sectors, but exhibited higher fatal accident rates. This finding “points to a possible selection effect, whereby more accident prone sectors have a greater tendency toward certification” (p. 38).

²¹ See also OHS BoK OHS Performance Measurement (in development at the time of writing).

In the United States, for example:

- Lo et al. (2014) investigated the impact of OHSAS 18001 certification on operational performance in 211 manufacturing companies and identified positive benefits with no trade-off between safety and financial performance, but rather companies “can expect to see increases in productivity and safety relative to uncertified peers.” This study adopted the rate of workplace violations as an indicator of OHS performance and found that certified companies experienced lower rates of violations (0.089 violations / 10,000 employees) than the industry two years prior to certification (0.641 violations / 10,000 employees).
- Poplin et al. (2018) compared injury data for two fire departments, one with an OHSMS and one without. In the former, post-intervention average injuries reduced by 13%, worker compensation claims reduced by 30% and claim costs reduced by 21%. However, the median monthly injury rates did not show statistically significant changes in either department, suggesting that OHSMS effectiveness may not significantly change over short time intervals.
- Two studies that investigated OHSMSS in animal production agriculture – on poultry farms and dairy farms – showed that the higher the degree of OHSMS institutionalisation, the lower the injury rates, with management leadership identified as the most influential element (Autenrieth et al., 2016a,b).
- Analysis of OHS program assessment records for 1,741 companies with up to 500 workers for the years 2015, 2016 and 2017 showed that management leadership, administration and supervision, and planning and evaluation manifested the most positive effects on OHS incident rates (Mulroy, 2020).

In Iran, Mohammadfam et al. (2017) compared the performance of three OHSMS-certified companies with three non-OHSMS-certified companies, using both proactive and reactive indicators to evaluate the effectiveness of 43 OHS practices across OHSMS policy, planning, implementation and operation, checking and management review activities. The results indicated significantly better overall performance of these practices by certified companies. In the same country, a case study in a powerplant involved data collection for 1,189 people employed between 2004 and 2011. It concluded that the implementation of safety programs, especially when integrated with other management systems and audited, was associated with health and safety improvements and reduced accident indices (Laal et al., 2019).

In Canada, analysis of workers' compensation claims for 14,377 OHSMS-certified firms and 11,338 non-certified firms for 2000-2015 revealed an overall lower rate of injury in certified firms, however this varied by sector, time period and size of firm (McLeod et al., 2019). The greatest injury-rate-reduction effects of OHSMS certification were identified in the manufacturing, trade, and transportation sectors (while no effect was observed in the oil and gas, business, and forestry sectors), in 2011-2015 and in large firms, indicating that “the

ability to prevent hazards targeted by certification may vary by work environment" (McLeod et al., 2019, p. A66).

5.3 OHSMS facilitators and barriers

This section identifies facilitators of OHS management systems and barriers to their implementation and success. It may assist OHS professionals in identifying elements that warrant high priority for organisational focus.

Arocena and Núñez (2010) found the adoption of OHSMSs to be affected by various external factors, including "the quality of industrial relations, rate of unionization, intensity of price-based competition, access to public aid and training activities provided by the OHS public agencies [and] technology [change] intensity" (p. 398). Mohammadfam et al. (2016, p. 119) determined that organisational factors with the greatest influence on the effectiveness of OHSMSs were "management commitment, workers' participation, allocation [of] financial resources, training, risk assessment, definite responsibility, communication and dissemination of occupational health and safety results and activities."

Almost et al. (2019) identified common facilitators and barriers to improving an OHS management system in the healthcare sector. Facilitators included board and executive support, employee engagement, effective cross-organisational communication, organisational culture, management and employee accountability, and performance monitoring. Barriers included workload, competing priorities with patients' needs versus employees' needs, limited resources to proceed with changes and to support health and safety education, and difficulty in engaging everyone in OHS topics.

Similarly, da Silva and Amaral's (2019) systematic review of 21 articles identified enablers of, and barriers to, successful OHSMS implementation:

[C]ritical factors of success [included] the support of the company management and senior management to OHS management...promotion of improvement of OHS communication in the company...greater commitment and participation of the workers...improved internal and external image of the company...development of a more proactive management of OHS...reduction of the number of accidents and occupation related diseases...and improved allocation of financial resources...

[B]arriers [included] the high cost of their implementation and management...the lack of commitment of the company management to the questions referring to OHS...difficulty for the workers to become involved and understand the importance of management in OHS...problems with the integration of different standards, attributes and adherence to company culture...difficulty in defining the appropriate management indicators in OHS...complexity of changing the company policy and culture...failures in the process of assessing the risks in OHS...and difficulties in the functioning of the OHS control and documentation systems (da Silva & Amaral, 2019, p. 130).

In 2001, the National Occupational Health & Safety Commission (NOHSC) published a review of the effectiveness of OHS management systems in the Australian context and identified three types of barriers to implementation of these systems:

- Failure to meet necessary conditions for OHSMS success (by not customising systems to organisational needs, imposition without consultation, weak senior management commitment and poor employee involvement).
- The inappropriate use of audit tools (where they become an end in themselves, are governed by misplaced management objectives, and are conducted without sound auditor skills, standards and criteria).
- Application in hostile contexts (small business, precarious employment, contractors and labour hire companies) (Gallagher et al., 2001, p. vii).

In elucidating the circumstances conducive to effective implementation of OHSMSs, Gallagher et al. (2001) provided detailed lists of OHSMS barriers and success factors that remain relevant today and inform the summary of OHSMS enablers, barriers and external factors in Table 2.

Table 2: Summary of OHSMS enablers, barriers and external factors²²

Enablers	Barriers	External factors
<ul style="list-style-type: none"> • OHSMS customised to the organisational context • Support from the Board • Management commitment and accountability • Provision of adequate resources • Conducive organisational culture • Proactive management • Worker participation and accountability • Actioned responsibilities • Adequate OHS training • Effective risk assessment • Effective OHS information communication • Stable workforce • Effective performance monitoring 	<ul style="list-style-type: none"> • OHSMS imposed without modification for organisational context • Resistant company culture • Lack of, or poor, management commitment • Inadequate resources • Inadequate management and/or worker engagement • Workforce composition changes • Complex or inefficient organisational processes • Difficulties in integrating OHSMS with other systems • OHSMS costs • Competing priorities • High workload • Inadequate OHS training • Weak contractor-subcontractor collaboration • Increased OHS paperwork • Ambiguous performance indicators • Ineffective, or inappropriate use of, monitoring tools 	<ul style="list-style-type: none"> • Industrial relations • Unionisation • Price-based competition • Legislation and standards • Support from OHS agencies • Pace of technological change • Benchmarking and best practice

²² Informed by Gallagher et al. (2001, 2003), Arocena and Núñez (2010), Mohammadfam et al. (2016), Almost et al. (2019), and da Silva and Amaral (2019).

6 Practical perspectives

Because the research literature does not necessarily reflect the contemporary experience of OHS professionals working with, and within, organisations, a forum was held to discuss OHS management systems. The forum was attended by eight OHS professionals who performed a variety of roles in organisations of various sizes and types across a range of industries. The forum discussion was stimulated by six key questions:

- What role do OHS management systems play in your overall OHS program?
- What are the strengths and weaknesses of OHS management systems?
- What barriers have you encountered in implementing an OHS management system?
- How do you see factors such as organisation size or industry domain impacting on the design and implementation of an OHS management system? What about organisational culture, supply chain, contractual relationships or other factors?
- What role has ISO 45001:2018 played in the design of the OHS management system in your organisation?
- What advice do you have for young OHS professionals relating to design and implementation of an OHS management system?

This section explores the themes that emerged from the forum discussion using the ‘voices’ of forum participants and then presents participants’ views on OHSMS strengths and weaknesses, development and certification.

6.1 Emergent themes

Four key themes emerged from the OHSMS forum discussion:

- Risk
- Culture and organisational maturity
- Compliance
- Prescription.

Risk

Forum participants acknowledged the goal of OHSMS is risk management, but also stressed that the design and process of OHSMSs have the potential to detract from risk management. Relevant comments included:

The purpose of, I think, all of these management systems, including health and safety is risk management for the organisation.

One of the weaknesses of systems is that they don't create that envelope, that risk-based envelope, to encourage innovation.

"You haven't updated your form, and you haven't dotted your 'I's and this form is slightly out of date." And you go, "how does that help me manage my risk?" and that is driving you away from managing your risk and going more to managing the process.

...it just stops helping you manage your risk and starts being a process that you manage as opposed to helping you manage and control the risk.

...the time spent focusing on the system, rather than the critical risks within the organisation...

Culture and organisational maturity

Participants were keenly aware of the influence of organisational culture and level of organisational maturity on OHSMSs.

You have to understand where you're standing in terms of the culture, because that actually helps you to understand, what is the purpose, why we are actually having this management system, and what is our goal that we are trying to achieve?

Organisational maturity...it does frame up how you think about how your system is constructed.

Organisations with no structure and low levels of understanding of safety, they'd benefit a lot, in my experience, from putting some basic structure in the system. But once you get to that slightly more mature state, you can become a slave to the system and it becomes a Word document, it becomes a process, it becomes much less helpful and much more unwieldy.

Compliance

One of the purposes of an OHSMS was identified as demonstrating *due diligence* in managing OHS. This requires that the system is actioned and complied with in the workplace. However, participants raised several issues associated with compliance that could be traced back to design, including failure to reflect on work-as-done and failure to adequately consider the needs of the target audience.

Failure to reflect on work-as-done:

The issue I've had here and elsewhere is people, especially safety people but other well-meaning individuals, who participate in the systems-writing stuff, the way they want things to happen, without understanding how it's going to happen.

...that ability for people to actually try and articulate it in a way that's meaningful for workers and management, to guide what you want them to do. ... You can't just launch into...here's what we're going to do, and I'm in my ivory tower, bang,

here it is, and then you go...I'm going to audit against them and that's going to force them to do what I want, just doesn't work.

So one of the challenges I think [is that] this is not only work-as-imagined but it is work-as-people-want it to happen, which is different to work as imagined, right?

... There's someone sitting in an office who's writing a management system and it's "what I actually want them to do." It's got nothing to do with work-as-imagined or work-as-done; it's work-as-aspired.

Failure to adequately consider the audience:

We're expecting people to understand what we're describing, but how do you know? We're talking about what safety professionals do and understand the system to be, but actually safety professionals aren't the target audience of the safety management system – it's the workers in the business. And so how do they understand the safety management system? And how do we train them? How do we communicate that? I mean, these are fundamental kinds of questions.

Who uses it? How could you possibly know as a frontline employee how to manage what your role is with this unwieldy process?

Keep it simple. The longer and more complex the documents and processes, the less likely people are to read them and use them...you're going to end up with a situation where you're not complying with your own documents.

Language is an interesting component. So you know, we communicate with people in social media, yet you get into a safety management system, and the procedures are written in a language that no one ever speaks...we seem to change it around, because that's how we legally write things. So I think there's an interesting part language plays and who writes the procedures.

Also, compliance was seen as an issue when organisations, especially small businesses, purchase off-the-shelf management systems:

So organisations, you know, they buy a safety management system, they buy the documents, they never use them, they never look at them, they get prosecuted, because they're the ones that have the fatalities, and they're easy targets.

However, model systems can provide a useful basis for customisation to suit the organisation:

...we will be able to take [a model system] and adapt it as much as we want to suit our needs. So my intention would be that we take on from the model system what does suit our needs, and then, obviously, consult internally, update those documented procedures and processes to suit our operations.

Prescription

Prescription was seen to detract from the perceived relevance of the OHSMS and to be inversely related to compliance:

We're talking about due diligence...the courts expect you to deploy your own system. So if you if you don't think your own system is right and you shouldn't be complying with it then you've got a bad system. You need to rework the system to be less prescriptive.

The processes that we put in place...people feel that there is excess documentation, we are just doing it for compliance, but it's not actually adding any value to influence the human behaviours out in the field.

Our governance team actually works on a lot of our corporate standards that get rolled out to the organisation. It's literally that, it's a document that sits in the system that nobody understands, nobody. It hasn't been implemented properly. It's just a piece of paper sitting there for when you get audited, but you won't be able to demonstrate the implementation of it.

In addition to creating a barrier to compliance, prescription was seen to stultify innovation:

If you're prescriptive, it actually limits people's ability to innovate and get better. We see that time and time again. If you're very, very detailed around your process, people will be expected to follow that and we create an environment and that might be fine given a certain cultural maturity, but in organisations that have a high level of maturity, do you want your workforce to be developing your processes and refining them and continually improving this whole work-as-imagined and so forth?

6.2 Strengths and weaknesses of OHSMS

Strengths and weaknesses of OHS management systems as identified by forum participants are listed in Table 3.

Table 3: Strengths and weaknesses of OHSMSS identified by forum participants

Strengths	Weaknesses
<ul style="list-style-type: none">• Create a framework or structure for systematic management of OHS• Make safety visible in the workplace• Support organisational discipline and consistency in governance, planning, operations, assurance and performance measurement• Facilitate alignment of OHS with other business processes	<ul style="list-style-type: none">• The process can become the focus rather than managing risk being the focus• Can be overly bureaucratic with an emphasis on documentation (with a resultant loss of focus on risk)• Can be inflexible• Tend to be based on work-as-imagined

Strengths	Weaknesses
<ul style="list-style-type: none"> Assist in determining priorities and allocation of resources Can mediate effects of power and politics in OHS Provide guidance for managers and others less experienced in managing OHS 	<ul style="list-style-type: none"> Resource intensive to design and maintain (can divert resources to the process rather than managing risk) Can be 'owned' by OHS professionals, siloed and divorced from the overall operational management process If on a dedicated organisational platform, system may not be easily accessible to supply chain partners and contractors

6.3 Development of an OHSMS

While not implying that these are the only relevant factors, the forum discussion resulted in four key recommendations for the development of OHS management systems:

- Define a clear purpose for the system that reflects organisational realities
- Ensure that the system is fit for purpose by considering context and scalability
- Ensure connectivity and integration
- Focus on managing OHS risks rather than OHSMS processes.

Purpose

With the overriding goal established as management of OHS risk to prevent injury and ill-health, one participant stated:

For me, the role of the safety management system is it's kind of like the glue...if you get it right, I think it can be the backbone for how safety can all come together.

However, within the context of the organisation there may be a range of perceptions as to the purpose of OHSMSs, including:

- To gain certification
- To demonstrate a licence to operate
- To give the Board confidence in demonstrating compliance and meeting due diligence.

Importantly, there should be defined objectives and clear goals for the OHSMS that reflect organisational realities rather than trite statements that, while well-intentioned, have little meaning.

I'd rather see managers allocate a budget and spend time doing a decent management review than getting a PA to put their electronic signature on a policy statement on the wall.

Fit for purpose

The role of the OHS professional is to ensure that the OHSMS is fit for purpose. This requires:

- Customisation to suit the organisational context
- Scalability to allow adaptation as organisational structural arrangements and delivery models change over time.

Context

Organisations operate within a context with external and internal elements that impact the role, design and implementation of an OHSMS.

- *External elements* include legislation, regulatory enforcement regimes, industrial relations environment, industry and community perceptions (such as social licence to operate).
- *Internal elements* include:
 - *Physical/structural*: size; structural complexity; business delivery models; composition of workforce; financial, physical and personnel resources
 - *Psychosocial*: organisational culture and maturity, leadership
 - *Risk profile*: nature of hazards, risk complexity, potential consequences of an adverse event.

In designing and implementing an OHSMS, OHS professionals need to understand their organisation, which will be “complex, constantly changing, usually reactive and often unpredictable.”²³ The *OHS Body of Knowledge* chapter 10.1 The Organisation discusses organisational complexity and gives OHS professionals three lenses – metaphorical, structural and integral – through which they can gain insights into organisational operations. In understanding the organisation as the precursor to designing and implementing an OHSMS, it is important to remember that:

An organisation is a system set up for a particular purpose and managed through its formal structures from which policy and operational processes emanate. But it is the informal infrastructures through which individuals interpret and operationalize the formal ‘rules’ that are important if these rules are to work. (Stowell, 2020)

Rather than attempting to define safety culture, the focus should be on organisational and management practices,²⁴ and the development of an OHSMS should be informed by a clear understanding of the actual management practices in the organisation. For example, leadership and the level of organisational maturity will impact OHSMS design and implementation. Forum participants advised that the OHSMS for less-mature organisations

²³ *OHS BoK* 10.1 The Organisation (p. 2)

²⁴ *OHS BoK* 10.2.1 Organisational Culture: A Search for Meaning.

may need to be simpler but more prescriptive. In more mature organisations, high levels of prescription can generate a negative view of OHS and inhibit innovation.

Scalability

Organisations vary in size, complexity and maturity. An organisation operating in the mining industry, for example, cannot be compared with a local government, transport or technology development organisation. Also, over time, organisations may change in size, complexity, business model or risk profile. The OHSMS needs to be scalable to the current needs of the organisation.

Connectivity and integration

Forum participants identified the crucial importance of connectivity and integration to successful OHSMS operation.

I struggle with this every day, how does the management system live and breathe in the business?...I guess that's probably a fundamental challenge to make it not stand alone, and to be widely understood, because, you know, perfect procedures that only I have access to or only I know about mean nothing.

So when you see it disconnect there, and the fact that all these systems are not being interconnected, are you able to achieve anything much with those organisations to achieve integration?

... integration with other systems and the thinking around that, I mean, particularly around process safety, and engineering and maintenance. Those two areas often are very poorly linked with safety and you tend to see major failures where those things don't go right in safety sense.

...linking to other systems that come out of legislation. So in the oil and gas industry, it's safety case, in the mining industry here it's your safety management plan. But the safety management system is what supports that regulatory gate.

Focus on risk management

As previously noted, the prime purpose of an OHSMS is to manage risk to prevent injury and ill-health. Because processes associated with OHSMSs may become barriers to risk management, the focus in design and implementation should also be on managing risks:

How will this element/requirement within the OHS management system contribute to managing risk?

6.4 Certification

Certification is defined by the International Organization for Standardization (ISO) as “the provision by an independent body of written assurance (a certificate) that the product, service or system in question meets specific requirements” (ISO, n.d.). In the case of OHS management systems, the standard is ISO 45001:2018. Thus, certification is not a management system but rather the assessment of the management system against the standard (not necessarily its OHS efficacy).

Generally, forum participants agreed that certification has significant benefits:

[Certification] provides a level of assurance...some credence around your system.

[Certification audits] are great for a sense check for your system to make sure that your system is okay.

Sometimes it can be quite a useful thing to say, “Well, actually, we've achieved this and this sort of a minimum benchmark that we've got the system to.”

However, participants acknowledged the potential for negative outcomes of certification when the focus is on OHSMS processes, documentation and audits rather than on addressing risk (see also section 6.1 Risk).

I am a fan of certification. But I do not love the components of certification that drive...some of our systems, it's kind of irrelevant. Some of the stuff that we need to have for our business doesn't really serve a good quality purpose...and I go, what are we doing this for? And they're like, Oh, we need it for certification. I'm like, I just feel like it's paper for the sake of paper.

I definitely think that it's the process driving what we do, as opposed to what we should be doing.

[Certification and audits] are totally divorced from risk and critical risk in particular.

A lot of our time is spent on focusing our energy and attention on [the audit], and the executive team are interested in audit scores, and not so much on managing our actual risks out in the field.

Basically, it gives some comfort to senior management: “nothing to see here.” It's all sort of “we got certification” when you could really be setting them up to fail. Because you receive certification, you might give the perception that everything is fine. And I think that's a false sense of security.

It is important for the OHS professional to ensure that the organisation's rationale for certification is clarified:

You need to understand why you're doing certification. Is it to manage your safety (which it might be)? Or is it because you actually need certification, or you have a regulator that requires you, in a high-risk environment, to have a site safety case management...or you have a regulator who's all over you.

Some organisations I've worked for are required to be certified to tender for work.

I don't think anyone in the organisations where I've worked has asked for certification for the benefit of the organisation; they've asked for certification as a licence to operate.

Definitely aligned with this certification issue, the whole licence to operate [and] I think that's a secondary consideration for OHS professionals.

In summary, one participant stated:

I find [certification] 70% helpful, 30% very unhelpful.

OHS professionals should be aware of the potential positive and negative outcomes of certification and address these when advising on the prioritisation of certification and in the design, implementation and maintenance of the system.

[Certification] shouldn't be something you set out to do first...I'd say there's 10 other things you need to be doing before certification.

For me...you need to do an internal review, which the process makes you do anyway. So there are good things around checking and assurance and making sure things are in place. I found that more valuable than the actual certification, running an internal audit, lifting up every stone, working out what you know, and we did that a year before we went to certification. We sorted lots of things out that were much better for the organisation and then we proceeded with certification.

7 Implications for OHS practice

This section provides some basic advice for OHS professionals wishing to build on existing organisational processes to develop an OHS management system. In addition to understanding the OHSMS organising elements and their interactions and interdependencies, OHS professionals need to be aware of the equivocal nature of relevant research, the issues accompanying OHSMS evaluation, and the facilitators and barriers associated with OHSMS implementation. As stated by Gallagher et al. (2003, p. 67), OHSMSs "can live up to their promise, but often fail to do so because of inadequate implementation or application in hostile environments."

It is likely that organisations will have, as a minimum, some rudimentary elements of an OHSMS. Although not specifically required under the model WHS legislation, an OHSMS that incorporates and connects the requirements described in applicable regulations and extends and supplements those based on a systems approach can increase the probability of effective legislative compliance. Instead of rushing to introduce missing elements, OHS professionals are advised to take a staged approach. Eight guiding principles for developing an OHS management system are described below:²⁵

1. Secure management commitment and manage expectations
2. Ensure connectivity of existing OHSMS elements
3. Evaluate the status of the OHSMS before making changes
4. Integrate the OHSMS with other organisational systems and processes
5. Gradually modify or introduce new elements based on system analysis
6. Ensure customisation to organisational context and needs
7. Ensure a systems approach
8. Facilitate ownership of the OHSMS by all stakeholders.

1. Secure management commitment and manage expectations

Before launching any initiative to change the current system and introduce an OHSMS as defined and characterised in this chapter, it is crucial to gain management commitment. If senior managers do not visibly and actively endorse the planned changes and resources are not allocated, the OHSMS may be reduced to some documents, mainly used for tendering or other commercial purposes, and fail to deliver the intended outcomes. In addition to the initial buy-in, it is essential to keep management informed on progress, to share small and big wins with them, and to remind them of their co-responsibility for implementing an effective OHSMS.

Equally important, the OHS professional must manage the expectations of all stakeholders and not generate false impressions. If the OHSMS is viewed as the platform to connect and promote OHS activities with the aim of improving OHS in harmony with other business objectives, then the success of the system will be evaluated against how well it is delivered and what value it adds for the workers and the organisation. If the introduction of the OHSMS is mainly linked to a certification process or compliance audits, it can be reduced to a list of unrelated items to be managed (Hopkins, 2005). Senior management may fixate on that list, focus on outcome measures and reactive indicators linked to the listed items, and lose the notion of a system that contributes to worker health, safety and wellbeing as well as preventing bad things from happening.

²⁵ See also OHS BoK 12.3.1 Rules and Procedures and OHS BoK 12.3.2 Document Usability.

2. Ensure connectivity of existing OHSMS elements

The initial step towards establishing an OHSMS is not to introduce missing elements, but rather to connect the existing ones. This can be done by identifying how each element can be used, or is already being used, in different system roles as outlined in section 4 (e.g., inputs, outputs, processes and feedback channels). For example, the risk-management element could simultaneously be an output of, and an input to, audits and incident investigations. However, if the risk management, OHS training and contractor management elements are disconnected and do not purposefully provide feedback to each other, the organisation has not designed a system. Although existing elements will inevitably interact to some extent, they can only form a coherent system if they purposefully interrelate, and their interdependencies are acknowledged. Karanikas (2017) demonstrated that a lack of connectivity and coherent communication can result in organisational misalignment of core safety management activities (safety audits, investigations and meetings).

3. Evaluate the current status of the OHSMS before making changes

After identifying and/or establishing connections between existing elements, evaluation of the current OHSMS (informed by Section 5.1 above) should target individual elements and their linkages. Results of a combined quantitative and qualitative assessment should reveal each element's added value to the OHSMS, strengths, weaknesses, risks and opportunities, and suggest what the organisation could maintain and improve without rendering the OHSMS unworkable or overly complicated for its context.

Evaluation issues such as those identified in section 5.1 above about auditing should not discourage attempts to systematically evaluate an OHSMS provided the limitations, assumptions and constraints accompanying each evaluation are acknowledged. Periodic snapshots of the state of the OHSMS, preferably based on the same or similar methods, are valuable for understanding whether the system is evolving in the desired direction. Whether focused on the OHSMS as a whole or specific elements, such evaluations can function as leading and positive performance indicators and afford linkages between the OHSMS and the organisation's strategic outcomes and successes. From a pragmatic perspective, organisations may wish to start with the 'convenient' or 'available' variables and gradually enrich the evaluation scheme. However, given these 'imperfect' parameters, organisations must be particularly cautious when interpreting evaluation results and informing decision making.

4. Integrate the OHSMS with other organisational systems and processes

If the OHSMS is not integrated into the organisation and other systems, its effectiveness will suffer and it may be seen as a burden and/or formality. Senior management may have signed the OHS policy but are OHS considerations an integral part of any plans and changes? Are OHS professionals and workers proactively included in planning and managing change processes? Having a systematic approach to OHS does not equal a systemic approach: "A distinction may be made between a systematic procedure or process, which is a set of logically ordered steps for doing something, and a system which consists of

a number of interconnected parts or components that interact in an organised way" (Bluff, 2003, p. 9). The latter corresponds to proactive OHS management where the organisation integrates the OHSMS into other systems and/or business processes.

To achieve integration, the OHS professional needs to identify those elements the OHSMS has in common with systems supporting other business areas (e.g. quality, environment, security and production). For example, if risk-assessment methods and tools are applied in other organisational areas, OHS professionals could approach colleagues, discuss what they do, adapt to current organisational practice, and offer insights and ideas from OHS practice and theory. In this manner, OHS can link to other organisational areas, contribute to a systems approach and strengthen collaboration among subsystems.

5. Gradually modify or introduce new elements based on system analysis

The OHS professional should ensure that new OHSMS elements are connected with existing elements, do not impose unnecessary complexity on the system, and contribute substantially to OHS outcomes. Introduction of one element at a time is recommended, with careful evaluation of design, implementation and interactions within and outside the OHSMS. In general, a staged approach with micro-experiments (e.g., testing locally before organisation-wide interventions) could be helpful when modifying existing elements or introducing new ones.

While establishing or improving an OHSMS, the OHS professional needs to contemplate the inescapable trade-offs in system composition. On the one hand, the more elements introduced into a system to render it 'complete,' the more complicated the system can become. Conversely, the fewer elements an organisation adopts in an attempt to keep the OHSMS relatively simple, the less capable the system may be in terms of capturing important OHS aspects. The element types discussed in section 4 above suggest that an OHSMS could be developed in consecutive steps (i.e., institutional followed by operational then compliance elements) with a higher priority assigned to the foundation elements within each category.

6. Ensure customisation to organisational context and needs

Customisation to the organisational context is crucial for any instrument or practice that is sourced externally. While off-the-shelf templates and solutions may be convenient, they can prove overly complicated or too simple for an organisation. Different organisations will implement the OHSMS organising elements outlined in the Appendix to various levels of detail. For example, small and medium businesses with less-rigid structures may not require all organising elements and detailed methods to implement an OHSMS consistently and effectively. If opportunities and problems are identified during work, shared immediately and respective decisions are made in a short time by management, a basic approach to risk management and consultation may be more appropriate than a sophisticated multilayered process for reporting ideas/problems, discussing their context, evaluating risks and alternatives, and implementing solutions and controls. The composition and form of

OHSMSs can be considered analogous to types of aircraft: while the goal for all aircraft may be the safe and efficient transportation of passengers and/or cargo at low financial and environmental costs, different aircraft types fulfil different needs. Smaller models are used for shorter distances and lighter loads, and larger ones are used for long-haul flights with greater load capacity.

7. Ensure a systems approach

During the OHSMS journey, the OHS professional must never forget to enact the systems concept. Implementing an OHSMS could initially seem like 'these AND those elements', 'this AFTER that element' or 'this BEFORE that element.' However, to ensure a systems approach, the ultimate goal is 'these WITH those elements.' Operational elements must be based on institutional elements and evaluated through compliance elements. Compliance elements must align with operational elements and focus on the areas indicated by institutional elements. The latter must consider the reality emerging from operations, adapt and inform the compliance elements.

It is crucial to acknowledge that OHSMS elements will interact in formal and informal ways and via implicit and explicit channels. The OHS professional's role is not to suppress or directly control those interactions but to recognise them and steer them towards fulfilling the collective purpose. The OHS professional should promote an integrative approach rather than advertise the OHSMS as more critical than other management systems. The OHSMS must become part of the organisational context, shape other contexts, and consider contextual variables beyond the ones directly relating to OHS.

8. Facilitate ownership of the OHSMS by all stakeholders

The dominant organisational culture, which includes and influences safety culture, will be a determinative success or failure factor when introducing a new or revised OHSMS. All the steps outlined above will likely fail if stakeholders, managers and workers are not incorporated as beneficiaries, owners and guardians of an OHSMS. This can be realised only through honest and open interactions and communication, participation opportunities, and an inclusive environment that encourages respectful debate and questioning. While prudent management and effective leadership create and influence the sociotechnical working environment, it is the workers who perform the occupational tasks and interact directly with the natural, technical and social environments while carrying out work. Whereas managers will lay the foundations of an OHSMS, the workers will eventually render it successful or not.

8 Summary

This chapter began by challenging the general understanding of what constitutes an OHS management system. It proposed a definition that conceptually repositions the OHSMS from a system for managing OHS (as defined in ISO 45001:2018) to a system for ensuring the health and safety of people, with workers, managers and all others affected by the work explicitly situated as integral parts of the system rather than external ‘users.’

In discussing the organising elements of an OHSMS, the chapter introduced a structured approach by categorising elements as institutional, operational or compliance (Madsen et al., 2020) with the elements within each category further classified as foundation, specific or resultant. This secondary categorisation highlights the interdependency of OHSMS elements. Together, the OHSMS organising elements should inform: high-level descriptions of the internal and external environments, practices and interrelationships to achieve the objectives; frameworks that detail how to achieve the goals; and methods that operationalise the frameworks.

The chapter distinguished between evaluation of an OHSMS as a system and evaluation of the impact of OHSMSs on the achievement of OHS objectives. While audits are often seen as the primary tool for evaluating OHSMS performance, the chapter identified issues with audits and recommended a more nuanced approach that includes both quantitative and qualitative performance indicators and subjective and objective measures. Such indicators and measures should be tailored to the needs and context of the organisation or particular areas within an organisation and be developed collaboratively by managers and workers with the input of specialists as appropriate.

OHSMS definitional issues and inconsistency of evaluation methods, systems and contexts of investigation have contributed to uncertainty about OHSMS effectiveness, and research outcomes should be interpreted with care. Nevertheless, strong evidence indicates that OHSMS customisation and integration, senior management commitment and worker participation are critical preconditions of OHSMS success. The chapter stressed that effective OHSMS implementation can depend on whether these and other conditions are met, and it summarised associated OHSMS facilitators and barriers.

A discussion forum of OHS professionals provided a practical perspective for this chapter. Themes that emerged from the discussion included the need to focus on risk (rather than be preoccupied with process), the impact of organisational culture and maturity on system design, and the links between compliance and prescription. Forum participants identified strengths and weaknesses of OHSMSs and proposed four recommendations for the design of OHSMSs:

- Define a clear purpose for the system that reflects organisational realities
- Ensure that the system is fit for purpose by considering context and scalability
- Ensure connectivity and integration
- Focus on managing OHS risks rather than OHSMS processes.

These recommendations were incorporated into eight guiding principles:

1. Secure management commitment and manage expectations
2. Ensure connectivity of existing OHSMS elements
3. Evaluate the status of the OHSMS before making changes
4. Integrate the OHSMS with other organisational systems and processes
5. Gradually modify or introduce new elements based on system analysis
6. Ensure customisation to organisational context and needs
7. Ensure a systems approach
8. Facilitate ownership of the OHSMS by all stakeholders.

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Appendix: OHSMS organising elements

This appendix aims to assist OHS professionals in understanding the role of OHS management system elements. It includes common OHSMS organising elements as informed by various publications (Archer, 2018; Hohnen & Hasle, 2018; ISO, 2018; Karanikas, 2014; Lutchman, 2012; Mansdorf, 2019; McKinnon, 2020) filtered by the experience of this chapter's first author. It is intended to supplement, not replace, knowledge of the relevant body of literature.

The table presents foundation, specific and resultant elements for each category of organising elements – institutional, operational and compliance (Madsen et al., 2020). Foundation elements drive and determine the success of specific elements, which, in turn, generate resultant elements. Content of the 'key considerations' column is based on the industry and academic knowledge and experience of the chapter's first author. To emphasise the integrative nature of OHSMSs, to provide an indication of the scope of elements and a link to technical information, the elements are cross-referenced to relevant *OHS Body of Knowledge* chapters.

OHSMS element category	OHSMS element	Brief description	Key considerations	Relevant OHS BoK chapter(s)
INSTITUTIONAL (design and specification)				
Foundation	Context	The organisation's internal and external environments	<p>Consideration of context allows an OHSMS to adjust to the continually changing environments in which the organisation operates.</p> <p>Internal context includes strengths and weaknesses relating to the composition and diversity of the workforce (e.g. staffing levels, skills, knowledge, experience, cultural backgrounds, expectations), currently available technology, infrastructure, capital, assets, liquidity, and current and future financial liabilities.</p> <p>External context refers to the social, national/regional, regulatory, business, and natural and technical environments and parameters. It includes the needs and expectations of external stakeholders, and threats and opportunities.</p>	4, 9.1, 9.2, 10.1
	Commitment	Visible management commitment to OHS	<p>Active involvement of top management is fundamental to the creation, implementation and sustainability of an OHSMS.</p> <p>If commitment decreases after implementation, an OHSMS can become largely a paper-based and superficial system.</p>	10.2.1, 10.2.2, 10.3
	Leadership	Consideration of leadership styles across the organisation	<p>The combination of transformational, transactional and servant leadership styles influences how organisational initiatives are conceived and perceived and whether they are followed due to motivation and trust or for the sake of compliance, pleasing or fear of repercussions.</p> <p>An OHSMS is not necessarily meant to enforce changes in leadership styles; rather, it is essential to understand how the OHSMS can function better under existing leadership styles, which can be challenged if the OHSMS does not deliver.</p>	10.2.1, 10.2.2, 38.1, 38.2
	Variability tolerance	The extent to which performance variability will be tolerated	<p>The balance between how much performance variability an organisation welcomes and what it wants to control, drives whether artefacts (e.g. strategies, policies, objectives, rules and procedures) will be the outcome of top-down, bottom-up or collective approaches.</p> <p>The prevalent culture, available resources, safety criticality of a work system and time available to respond to changes in a system may necessitate different approaches to whether procedures and rules will be imposed top-down, produced at the work floor, or negotiated.</p>	10.2.1, 10.2.2, 10.3, 12.1
Specific	Scope	The boundaries of OHSMS	The scope refers to what the OHSMS includes and excludes so as to avoid conflicts or gaps. It can shift, expand or shrink over time, and can refer to organisational sections (e.g. areas possibly governed by other systems or areas of potential future relevance) or activities (e.g. exclusion of safety engineering aspects without neglecting any dependencies).	12.1



OHSMS element category	OHSMS element	Brief description	Key considerations	Relevant OHS BoK chapter(s)
	Integration	Incorporation with other management systems	<p>OHS must be gradually embedded in decision making across all organisational levels, and the OHSMS must mutually exchange best-practice methods, concepts, etc., with other management systems.</p> <p>In parallel with OHS, the OHSMS must consider objectives of other management systems (e.g. quality, finance, security) to avoid clashes, to contribute to an equilibrium and to be accepted as a partner. Otherwise, the OHSMS may become an add-on or unwanted burden.</p>	10.1, 10.3, 12.1, 38.1
	OHS policy	Overall OHS intentions and direction	OHS policy justifies the existence of the OHSMS, articulates organisational commitment to and vision for OHS, and embeds worker consultation. Although a high-level and relatively abstract artefact, OHS policy is an essential driver and reference point for all OHSMS elements.	5, 6
	OHS objectives	Desired destination of the organisation regarding OHS	<p>Objectives are long-term intentions that can be achieved via goals that are usually more short-term and mid-term targets.</p> <p>Designing objectives and goals using SMART (specific, measurable, achievable, relevant and time-bound) criteria can increase the potential for them to be understood, monitored and evaluated.</p>	5, 6, 10.2.1, 10.2.2, 12.5
	Roles	Individual and departmental responsibilities, accountabilities and authorities regarding OHS and the OHSMS	<p>Everyone must have an active role in OHS by contributing to the design, implementation and improvement of all OHSM elements.</p> <p>Responsibilities must be commensurate with the availability of resources, delegated authorities and relative opportunities to influence OHS aspects.</p>	3.1, 4, 10.2.1, 10.2.2, 10.3, 12.1, 37.4, 38.1, 38.3
	Structure	OHSMS form and functions	<p>Depending on its size, location(s) and other contextual parameters, the organisation can establish departments, offices, etc., and/or appoint individuals and teams to facilitate the OHSMS lifecycle.</p> <p>The principal contribution of such functions is advisory and consultative; they do not typically have executive powers. Overzealousness of appointed persons with the OHSMS elements could threaten integration of the OHSMS with other management systems and reduce the sense of OHSMS ownership by everyone.</p>	3.1, 10.3, 12.1, 37.2, 37.3, 38.1, 38.2
	Resources	Means of support for the OHSMS	Realisation of the OHS policy and objectives, mobilisation of the OHSMS structure and roles, and operation and sustainability of OHSMS elements cannot occur without investment	10.1, 37.4, 38.1, 38.3



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OHSMS element category	OHSMS element	Brief description	Key considerations	Relevant OHS BoK chapter(s)
			<p>of, for example, staffing, infrastructure, technology, workforce planning, processes, time, and knowledge and information access.</p> <p>If adequate resources are not secured, the OHSMS will compete for resources with other management systems, resulting in division and clashes rather than integration.</p> <p>Given the reality of finite capacity, OHSMS and other management systems must collectively agree on what allocation of resources best serves the organisation as a whole and not the perfection of each management system individually.</p>	
Resultant	Documentation	Creation, maintenance and update of OSHMS records, evidence, reports, etc.	<p>OHSMS documents must describe elements at the level of detail necessary to ensure an appropriate balance between discretionary and prescriptive content to suit the organisational context. While vague statements may result in confusion and diversion of resources to tasks unrelated to OHS policies and objectives, highly prescriptive texts will restrict flexibility to manage OHS within inevitably variable conditions and may inhibit assumption of ownership of the OHSMS.</p> <p>OSHMS documentation is the reference point for examination of the gaps between design and implementation; it is not meant to be an inflexible or perfect element, nor used to judge. More paperwork does not correlate to better OHS, and excessively detailed OHSMS elements may generate additional liabilities.</p>	12.3.1, 12.3.2
OPERATIONAL (implementation and performance)				
Foundation	Communication	Multidirectional, productive and honest communication internally and externally	<p>Communication channels can be synchronous (e.g. meetings, discussions) and asynchronous (e.g. emails), formal and informal.</p> <p>Internal communication must be meaningful and purposeful, tailored to the needs and capabilities of the persons involved and based on mutual trust.</p> <p>External communication includes observation of the regulatory and business landscapes, and mutual exchange of practices, ideas, methods, lessons learned, etc.</p>	8.1, 8.2, 8.3, 10.1, 37.4, 38.1, 39.1
	Participation	Genuine opportunities to actively engage in the OHSMS	<p>Worker participation is fundamental to OHSMS effectiveness.</p> <p>The OHSMS must respect and seek inclusion and diversity to ensure adequate representation and reconciliation of multiple perspectives and needs.</p> <p>Provision of opportunities to participate will increase the sense of OHSMS ownership.</p>	8.1, 8.2, 8.3, 10.2.1, 10.2.2, 37.4, 38.1



OHSMS element category	OHSMS element	Brief description	Key considerations	Relevant OHS BoK chapter(s)
			Not all invitees will respond to calls for feedback and contributions, but this does not remove the need to welcome everyone to engage with the (re)design, implementation and improvement of the OHSMS.	
Specific	Incident management and investigation	Necessary responses to an incident	<p>Responding to an incident can include providing health aid to persons involved, securing the incident site, notifying authorities if necessary, initiating an incident investigation, sharing positive and negative investigation findings, and agreeing on measures to promote the positives and control the negatives.</p> <p>Beyond investigations mandated by legislation, the organisation may not have the capacity to investigate all incidents and with the same depth. Reasonable criteria must be in place to select which incidents to investigate under organisational capacity levels per timepoint.</p> <p>Constraints, limitations and assumptions of investigations completed can be stated in reports and other records to increase transparency and to help investigations improve over time.</p>	12.6, 36, 38.2
	Return to work	Provision of work rehabilitation support to employees returning to work after an occupational injury	<p>The goal is to maximise the worker's independent functioning over time through the delegation of suitable duties, ongoing support from qualified persons (e.g. physicians and psychologists), and necessary aids and equipment.</p> <p>Attention must be paid to integrating the worker back into the workforce and controlling the risk of stigmatisation from managers, supervisors and peers during and after the work rehabilitation program.</p>	8.1, 8.2, 35
	Risk management	Identification and management of positive and negative risks	<p>Risk management includes the stages of hazard/opportunity identification, risk evaluation, risk response and monitoring.</p> <p>Hazards and opportunities can emerge from various internal sources (e.g. formal and informal communications, voluntary reports, incident investigations, audits, inspections, observations, real-time emerging conditions) as well as external sources (e.g. OHS alerts from regulatory and professional bodies, external studies and reports, meetings with other organisations).</p> <p>Excluding core engineering applications that can be adequately tested, in sociotechnical systems, there is always a considerable degree of uncertainty about the actual risk level. The greater the diversity and relevant experience of the persons involved in risk evaluation, the more their subjectivities will counteract each other, increasing the validity of the outcome.</p>	7, 8.1, 10.1, 12.1, 14-35



OHSMS element category	OHSMS element	Brief description	Key considerations	Relevant OHS BoK chapter(s)
Process safety and other safety domains			<p>Risk responses must encompass all applicable parameters, including existing and additional controls and their anticipated/recorded effectiveness, expected residual risk levels and possible unintended consequences, cost-benefit ratio, response time, practicality, acceptability, enforceability, durability, compliance with legislations, etc.</p> <p>Monitoring must target all risk-management areas (e.g. new and changed hazards and opportunities, alteration of risk levels, actual effectiveness of controls).</p> <p>Time and resource constraints do not allow systematic and structured risk management across all organisational levels. Workers at the frontline of operations will perform real-time risk management more intuitively than persons at strategic and tactical levels. The success of risk management must be evaluated against the opportunities provided.</p> <p>The more everyone is engaged in systematic risk-management activities when conditions allow, the better the balance between rational and intuitive decision making when it comes to emerging situations that cannot afford the implementation of highly structured methods.</p>	
	Process safety and other safety domains	Connections with safety domains addressing aspects beyond OHS	<p>The OHSMS must consider linkages, relationships and dependencies with other safety areas (i.e. public, service/operational, product and environmental safety).</p> <p>The maintenance and improvement of OHS via an OHSMS can positively support other safety domains, while OHS problems may negatively influence other areas.</p> <p>Similarly, achievements or problems in other safety areas may positively or negatively impact OHS.</p>	13
	Contractor management	Mutual and exclusive OHS obligations of the organisation and its contractors	<p>Regardless of their role in a project or operation, workers and other system elements of involved organisations will interact and possibly depend on each other. This will affect how onsite health and safety will be collectively managed (what, when, who, how and where).</p> <p>Attention is necessary to avoid (1) gap areas where no party perceivably assumes health and safety responsibility, (2) overlapping areas where one party remains inactive because it presumes that another part will act, and (3) conflict areas where health and safety responsibilities, priorities and practices of different parties compete.</p> <p>Each contractor's profile in managing OHS could be one of the criteria to rank and select contractors in specific contexts, especially when the organisation does not have relevant in-house expertise.</p>	12.4



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OHSMS element category	OHSMS element	Brief description	Key considerations	Relevant OHS BoK chapter(s)
	Procurement and outsourcing	Assurance that procured/outsourced products and services, including the respective organisational processes, do not negatively impact OHS	<p>Product specifications and service characteristics must meet the minimum foreseen OHS-related criteria (e.g. regulations and internal documents).</p> <p>If multiple candidate products/services satisfy health and safety requirements, respective ranking criteria could be included in the decision making together with other business parameters (e.g. quality features and purchase costs).</p> <p>Procurement/outsourcing processes should support and facilitate work and not impose unjustifiable delays and obstacles that could intensify trade-offs between goals and jeopardise achievement of objectives, including health and safety objectives.</p>	12.4
	OHS education, training and competency	Provision of information and creation of knowledge and skills to manage OHS	<p>OHS education and training and the development of relevant competencies must be tailored to the defined OHSMS roles and responsibilities. It must consider the conditions of its receivers (e.g. young and vulnerable workers, various levels of previous experience, various cultural backgrounds), the optimum combinations of content and mode of delivery, and the valid assessment of results.</p> <p>The more salient and relevant OHS education and training is to work activities and deliverables, the more OHS will integrate with other work objectives over time.</p>	7.8.1, 8.2, 8.3, 10.2.1, 10.2.2, 37.1, 37.3, 37.4
	Emergency preparedness	Response to irregular events that severely harmed or have high potential to harm the organisation	<p>The organisation must be prepared for the unexpected and demonstrate resilience by mobilising resources in a coordinated fashion, limiting adverse outcomes, facilitating rapid recovery and further improving its systems.</p> <p>Emergency preparedness plans and drifts cannot capture all possible eventualities and unknowns that can severely impact OHS or other aspects. However, a systematic and systems approach to, and continual familiarisation with responses to, categories of events (e.g. fires, natural disasters) will increase the likelihood of successful management.</p>	7, 8.1, 10.1, 12.1, 36
	Management of change	Assessment and management of the impact of significant internal and external changes on OHS	<p>As every alteration in a system can be considered a change, criteria must be in place to define what comprises a significant change for the organisation (e.g. a substantial redesign of a work system, the broad introduction of technology). Changes not meeting those criteria can be dealt through the OHSMS element of risk management.</p> <p>Significant changes necessitate multidisciplinary and transdisciplinary engagement and a structured approach with careful planning and assessment, one or more pilot tests/experiments and adjustments, gradual implementation and adjustments, and broader implementation and monitoring.</p>	8.1, 8.2, 8.3, 10.2.1, 10.2.2, 12.1. 37.4, 38.2



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OHSMS element category	OHSMS element	Brief description	Key considerations	Relevant OHS BoK chapter(s)
	Record keeping	Maintenance of records to facilitate monitoring of the implementation, performance and evolution of the OHSMS	<p>This element does not aim to capture all OHSMS activities and content to create a centralised monitoring mechanism to control the behaviour of the system or its elements. Different records can be maintained at various organisational levels depending on their respective OHSMS roles and responsibilities.</p> <p>Records can first refer to more generic activities and then move towards more detailed ones depending on the added value and necessity. If a record is not useful to improve the OHSMS or OHS, it is not necessary.</p> <p>Records can be shared across organisational levels to allow reflection and exchange of best practices and difficulties. Those records should not be primarily used to perform direct comparisons as each context differs from others.</p> <p>Documentation does not provide strong evidence of a well-functioning OHSMS as there are intangible activity aspects that cannot be directly recorded (e.g. the sustainability of effects, quality of communications and interactions, conflicts and tensions, satisfaction and trust, honesty and care).</p>	12.3.2, 12.5, 39.2
Resultant	Achievement of health and safety objectives	Achievement and maintenance of OHS objectives	<p>The coordinated implementation of OHSMS elements, including recognising their mutual effects and dependencies, will promote the realisation of OHS objectives and incarnation of the OHS policy.</p> <p>Inability to achieve and sustain the OHS objectives may be due to one or more of the following:</p> <ul style="list-style-type: none"> • Unrealistic objectives (e.g. objectives designed without consideration of organisational context) • Poorly designed OHSMS elements (e.g. elements that do not serve the objectives) • Lack of recognition of OHSMS element interdependency (e.g. absence of a systems approach). 	5, 6, 12.5, 37.1
	Shared learnings	Cross-learning from OHS positives and negatives	<p>Learning does not result from storage of information, but from the wide usage of information to encourage reflection and adaptation. Interactions within the OHSMS must not stop the exchange of information but transform it into learning opportunities.</p> <p>A balance between positive and negative lessons will minimise fear from the excessive focus on negatives and complacency from the over-advertisement of successes.</p>	10.2.1, 10.2.2, 38.2



OHSMS element category	OHSMS element	Brief description	Key considerations	Relevant OHS BoK chapter(s)
COMPLIANCE (verification and adaptation)				
Foundation	Criteria and indicators	Establishment of monitoring methods and measures	<p>The way an organisation assesses its OHSMS must be valid, reliable and suited to its context to derive representative and meaningful results and drive improvements. No method is perfect as all include limitations and their application will depend on less-than-perfect data and information.</p> <p>Choice of metrics should be evidence-based, and the role of proactive and reactive measurement defined. A good set of metrics will include a combination of both quantitative and qualitative data and be specific, measurable, valid, immune to manipulation, manageable/practical, reliable, sensitive to changes in conditions, cost-effective and contextualised.</p> <p>Not everything that can be measured adds value by default and anything that cannot be measured cannot be rejected as useless by default.</p>	12.5, 39.1, 39.2
Specific	Audits, inspections, observations, reviews	Snapshots of what is happening at specific timepoints	These activity types must target the collection of both quantitative and qualitative data. Periodic collection of quantitative data can help monitor trends over time while qualitative data can provide necessary context for the interpretation of quantified findings.	12.5
	Studies, research	Processing of data and information from multiple sources and timepoints	The constantly changing environment means that past records (and metrics based on those) may not accurately reflect the current situation. Collecting data and information about the present can enrich the picture of how the OHSMS performs, support comparisons with the past and lead to revisions of the OHSMS, including its verification methods.	39.1, 39.2
Resultant	OHSMS improvement and adaptation	(Re)design of the whole OHSMS or specific elements	<p>The principal aim of verification activities is to examine the need to redesign existing OHSMS elements, introduce new ones and cancel others.</p> <p>The OHSMS is the vehicle for OHS improvement, not the destination. It cannot capture all work system dynamics, and compliance with it does not immediately guarantee that OHS objectives are met or legislative requirements are satisfied.</p>	10.3, 12.1



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